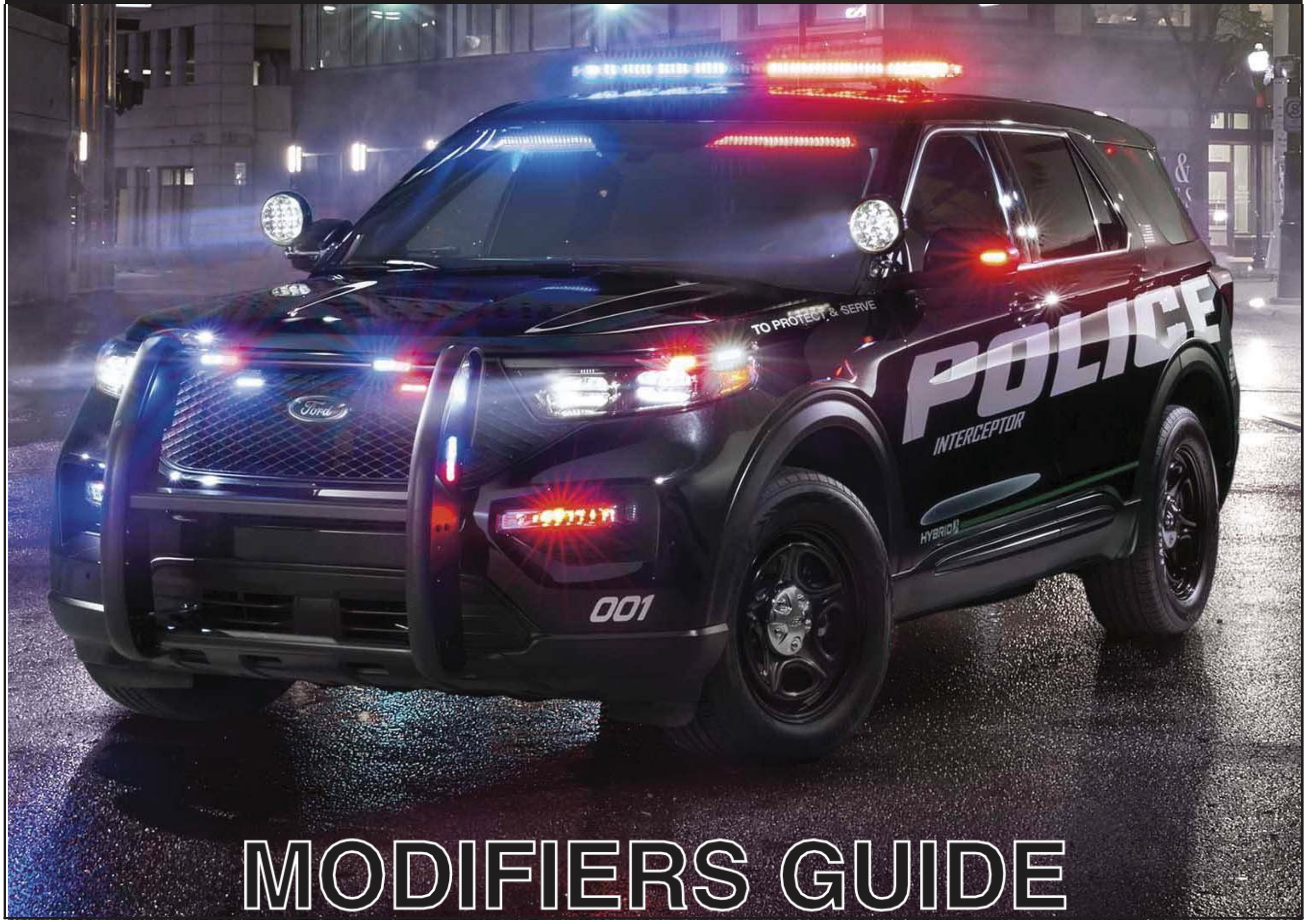
2023

Police Interceptor Utility

Police Interceptor Utility Hybrid


TO PROTECT & SERVE
POLICE
INTERCEPTOR
HYBRID
001

MODIFIERS GUIDE

Table of Contents

Contents **PAGE**

Introduction 0-2
  Genuine Ford Accessories For Your Vehicle 0-2

Introduction

Introduction

Ford Motor Company has assembled this guide to assist vehicle modifiers in producing a safe and quality vehicle. Ford believes safety and quality come first. To achieve customer satisfaction, we want to assist modifiers in achieving the highest standards of safety and quality in their vehicles.

This book is divided into topics pertinent to vehicle modifiers. References are made to the Workshop Manual for appropriate service procedures, torque specifications, component separation clearances and other standard information which is common with an unmodified vehicle. Specifications unique to this guide are designated.

This modifier guide is not a "how-to" book; it should be used as a checklist to help make sure that certain important steps in the modification process are considered. It is ultimately the responsibility of the upfitter with knowledge of the entire upfit to ensure the checklist is complete. While Ford is providing this information to assist modifiers, it does not warrant the vehicles, methods, materials or the workmanship of the modifier. Ford also does not warrant against failures that result from the modification of a vehicle.

Following the guidelines contained in this guide does not assure individual modifiers that the products they modify comply with US Federal or Canadian Motor Vehicle Safety Standards in effect at the time of the modification. The guidelines set forth are based on engineering analysis of typical vehicles. If the guidelines are followed, the modifier's efforts in certifying vehicles to applicable standards should be aided. Compliance testing that may be required for certification of specific vehicle configurations or construction is the sole responsibility of the individual modifier.

The only model suitable for use in police service is the pursuit-rated Police Interceptor.

DuPont™ and KEVLAR® are trademarks or registered trademarks of DuPont™ or its affiliates.

Genuine Ford Accessories For Your Vehicle

A wide selection of genuine Ford accessories are available for your vehicle through your local authorized Ford or Ford of Canada dealer. These quality accessories have been specifically engineered to fulfill your automotive needs; they are custom designed to complement the style and aerodynamic appearance of your vehicle. In addition, each accessory is made from high-quality materials that meet or exceed Ford's rigorous engineering and safety specifications. Ford Motor Company will repair or replace any properly installed genuine Ford accessory found to be defective in factory-supplied materials or workmanship during the warranty period, as well as any component damaged by the defective accessory. The accessory will be warranted for whichever provides you the greatest benefit:

- 12 months or 20,000 km (12,000 mi), whichever occurs first; or
- the remainder of your new vehicle limited warranty.

This means that genuine Ford accessories purchased along with your new vehicle and installed by the dealer are covered for the full length of your new vehicle's limited warranty — 3 years or 60,000 km (36,000 mi), whichever occurs first. Contact your dealer for details and a copy of the warranty.

Considerations When Using or Installing Accessories

For maximum vehicle performance, keep the following information in mind when adding accessories or equipment to your vehicle:

- When adding accessories, equipment, passengers and/or luggage to your vehicle, do not exceed the gross vehicle weight rating (GVWR) or gross axle weight rating (GAWR) as indicated on the Safety Compliance Certification Label. Consult your dealer for specific weight information.
- The Federal Communications Commission (FCC) and Canadian Radio Telecommunications Commission (CRTC) regulates the use of mobile communication systems, such as 2-way radios, telephones and theft alarms that are equipped with radio transmitters. Any such equipment installed in your vehicle should comply with FCC or CRTC regulations and should only be installed by a qualified service technician.
- Mobile communication systems may harm the operation of your vehicle, particularly if they are not properly designed for automotive use.
- To avoid interference with other vehicle functions, such as the anti-lock brake system (ABS), amateur radio users who install radios and antennas onto their vehicle should not locate the antenna in the area of the driver's side hood.
- Electrical or electronic accessories or components that are added to the vehicle by the dealer or the owner may adversely affect battery performance and durability.

Table of Contents

Contents **PAGE**

Section 1: General Information 1-2
- Important Safety Notice 1-2
- Police Vehicle Definition 1-3
- Good Practices 1-3
- New Vehicle Storage 1-3
- Police Vehicle Definition 1-4
- Tires and Loading 1-4
- Ambient Temperature Change and Tire Pressure 1-6
- Ride Height Measurement — Front 1-7
- Ride Height Measurement — Rear 1-9
- Ride Height Specifications 1-10

Section 1: General Information

Section 1: General Information

Important Safety Notice

NOTE:
The descriptions and specifications contained in this guide were in effect at the time this guide was approved for printing. Ford Motor Company reserves the right to discontinue models at any time, or change specifications or design without notice and without incurring obligation.

Appropriate repair methods and procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This guide provides general direction and guidelines for performing modifications to the vehicle, which will help assure reliability.

There are numerous variations in procedures, techniques, tools and parts for modifying vehicles, as well as in the skill level of the individual doing the work. This guide cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this guide must first establish that they compromise neither their personal safety nor the vehicle integrity by the choice of methods, tools or parts.

Warnings, Notices and Notes

As you read through this guide, you will come across WARNINGS, NOTICES and NOTES. Each one is there for a specific purpose. WARNINGS remind you to be especially careful in those areas where carelessness can cause you personal injury. NOTICES are given to prevent you from making an error that could damage the vehicle or the vehicle's components. NOTES give you added information that will help you to complete a particular procedure. The following list contains some generalized warnings that you should follow when working on a vehicle.

⚠ **WARNING:**

- **The nominal High Voltage Traction Battery (HVTB) voltage is approximately 300 volts DC. The HVTB and charging system contain high voltage components and wiring. High voltage cables and wiring are orange in color. Before carrying out any vehicle modifications, the HVTB must be depowered. Any modification, service, or repairs to the high voltage system or its components, must be done by a trained service technician. Failure to follow these instructions may result in severe personal injury or death.**
- **For eye protection, always wear safety glasses.**
- **Use safety stands whenever a procedure requires you to be under the vehicle.**
- **Make sure the ignition switch is always in the OFF position, unless otherwise required by the procedure.**
- **Set the parking brake when working on the vehicle. The gear selector should be set in PARK unless instructed otherwise for a specific operation. Place wood blocks (4 inch x 4 inch or larger) against the front and rear surfaces of the tires to help prevent the vehicle from moving.**
- **Do not smoke while working on a vehicle.**
- **To reduce the risk of injury, always remove rings, watches, loose hanging jewelry and loose clothing before working on a vehicle.**
- **When it is necessary to work under the hood, keep hands and other objects clear of the cooling fan blades.**
- **Failure to follow these instructions may result in personal injury or death.**

NOTICE:

- **Do not modify the cooling system. High voltage vehicle components may be damaged if any cooling system modifications are attempted.**
- **Before placing the vehicle in a paint booth, make sure that the HVTB is not installed in the vehicle. In addition, the Charge Port Light Ring (CPLR) must be covered / protected from heat. High paint booth temperatures may damage the HVTB and the CPLR.**
- **Remove the service disconnects while carrying out any vehicle modifications.**

Making Safety Devices and Elements Inoperative

The vehicle contains many safety features required by US Federal or Canadian Motor Vehicle Safety Standards. These features, which include the key-on-ignition chime and brake lights, should never be disabled or modified.

CFR 49 Section 30122 states that "A manufacturer, distributor, dealer or motor vehicle repair business may not knowingly make inoperative any part of a device or element of design installed on or in a motor vehicle or motor vehicle's equipment in compliance with an applicable motor vehicle safety standard prescribed under this chapter unless the manufacturer, distributor, dealer or repair business reasonably believes the vehicle or equipment will not be used (except for testing or a similar purpose during maintenance or repair) when the device or element is inoperative."

Section 1: General Information

Police Vehicle Definition

The Police Interceptor vehicle is put through twice as many cycles of Ford's standard vehicle durability tests to make sure it meets the rigors of police usage. This vehicle testing is in addition to substantial component durability testing. This extra testing for the Police Interceptor certifies to Ford the entire vehicle is "heavy-duty" and suitable for police usage.

Good Practices

Process and Quality Assurance Systems

A formalized Process and Quality Assurance Systems check may be helpful in consistently producing high-quality products. An overview of some of the key items for such a system are outlined in this section.

Quality Assurance

Completed unit sign-off: All control items should be inspected with a written sign-off. All labels should be inspected and signed off, including verification that the information on the labels is correct. All appropriate systems should be checked for leaks. A road test should be performed to verify that all systems are operating correctly. All systems and functions that were provided by Ford should be checked to make sure that they function correctly after the build process.

The modifier's Process and Quality Assurance Systems should also make sure that appropriate training is provided to the employees.

Minimum and Maximum Screw Sizes

When installing aftermarket equipment, avoid using fasteners that are too long for the application or are in an area which might damage vehicle components, including the low voltage wiring, the high voltage system including the HVTB and the (orange) high voltage wiring/cables, brake lines, fuel tank and lines, powertrain components, exhaust system or suspension.

New Vehicle Storage

New Vehicle Storage — General

- Vehicle should be stored in a dry, ventilated place, and protected from sunlight, if possible.
- If vehicle is stored outside, maintenance against rust and damage, as described below, is recommended.

NOTICE:
Keep all rubber parts free from oil and solvents.

New Vehicle Storage — Body

- Wash vehicle thoroughly to remove dirt, grease, oil, tar or mud from exterior surfaces and underside of front fender.
- Periodically wash if vehicle is stored in exposed locations.
- Touch up exposed raw or primed metal to provide rust protection.
- Cover chrome and stainless steel parts with a thick coat of auto wax to prevent discoloration. Rewax as necessary when the vehicle is washed.
- Lubricate all hood, door hinges and latches with a light grade oil.
- Cover the interior soft trim to prevent fading.

New Vehicle Storage — Engine

- Start the engine every 15 days. Run it at fast idle until it reaches normal operating temperature.
- With foot on brake pedal (and brake applied), shift the transmission into all gears while the engine is running.

New Vehicle Storage — Fuel System

- Regularly move vehicle short distances to mix fuel anti-oxidation agents.

NOTE:
During extended periods of vehicle storage (60 days or more), gasoline may deteriorate due to oxidation. This can damage rubber and other polymers in the fuel system and may clog small orifices. A commercially available gasoline fuel stabilizer (Sta-Bil or equivalent) should be added to gasoline-powered vehicles whenever actual or expected storage periods exceed 60 days. The manufacturer's instructions packaged with the product should be followed. The vehicle should then be operated at an idle speed to circulate the additive throughout the fuel system.

Section 1: General Information

New Vehicle Storage — Tires

Most high performance tires are made with nylon overlay.

As such, the following steps should be taken to avoid flat spotting when the vehicle is not used for a period of time.

- Keep the vehicles tire pressure at the recommended operating pressure.
- If the vehicle is stored for a period longer than 15 days, it should be moved several feet during each 15-day period. The vehicle should be parked after being moved so that a different portion of the tread contacts the ground.

Vehicle Storage — Electrical

NOTICE:
If your vehicle is to be stored for 30 days or longer, the low voltage (underhood) battery negative terminal must be disconnected. Failure to do this could damage the vehicle's battery.

NOTE:
Extended storage time which results in the discharge of the low and/or high voltage batteries, may result in the setting of Diagnostic Trouble Codes (DTCs) and/or a no-start condition.

To maintain the high voltage battery charge, once a month your vehicle's high voltage batteries should be charged. This will maintain the high voltage battery, but may not be enough to maintain the low voltage (underhood) battery and additional low voltage (underhood) battery charging may be required after 60 days.

Police Vehicle Definition

The Police Interceptor vehicle is put through twice as many cycles of Ford's standard vehicle durability tests to make sure it meets the rigors of police usage. This vehicle testing is in addition to substantial component durability testing. This extra testing for the Police Interceptor certifies to Ford the entire vehicle is "heavy-duty" and suitable for police usage.

For standard features and options please refer to www.fleet.ford.com

Tires and Loading

Tire Replacement Requirements

⚠ **WARNING:**
Only use replacement tires and wheels that are the same size and type (such as P-metric versus LT-metric or all-season versus all-terrain) as those originally provided by Ford. Use of any tire or wheel not recommended by Ford can affect the safety and performance of your vehicle, which could result in an increased risk of the loss of vehicle control, vehicle rollover, personal injury or death. Additionally, the use of non-recommended tires and wheels could cause steering or suspension failure. If you have questions regarding tire replacement, see an authorized Ford or Lincoln dealer.

NOTICE:
Do not install an off road, aggressive tread or incorrectly sized tire. Any of these may cause elevated stress to the steering system. This can cause the power steering system to overheat and shut off the power assist, which can affect the safety and performance of your vehicle.

NOTE:
Vehicles are equipped with a reduced rolling resistance tire design. The use of a different tire can affect the travel distance of the vehicle as well as the vehicle's fuel economy.

Make sure all tires and wheels on the vehicle are of the same size, type, tread design, brand, load-carrying capacity and speed rating because it can affect the safety and performance of your vehicle, which could result in an increased risk of loss of vehicle control.

Tire Pressure Monitoring System (TPMS) Principles of Operation

The TPMS monitors the tire pressure using 4 valve stem mounted TPMS sensors to provide accurate tire pressures. Each individual sensor contains its own battery and transmits tire pressure data to the controlling module every 60 seconds when the vehicle speed exceeds 32 km/h (20 mph). The TPM module is a radio receiver that collects the tire pressure data and relays the information via the MS-CAN to the BCM. All of

Section 1: General Information

the TPMS functions are controlled by the BCM. The TPMS sensors are trained to the BCM, which records each TPMS sensors unique identifier. The BCM records where each TPMS sensor is located based on the training order and compares the actual tire pressure with the desired tire pressure as indicated on the Vehicle Certification label. If the tire pressure deviates from the desired tire pressure the BCM, using the HS-CAN, signals the IPC to illuminate the TPMS warning indicator and also displays a message on the message center. The programmed tire pressure cannot be changed.

This vehicle, as delivered by Ford Motor Company, conforms to Standard FMVSS138, Tire Pressure Monitoring

Systems. This system may not function if any of the following components are removed, relocated or modified in any

way:

- Original Equipment Manufacturer (OEM) wheels and tires
- Tire pressure sensors or valve stems
- Body Control Module (BCM)
- Body Control Module (BCM) software and calibrations
- Tire Pressure Module (TPM)
- Instrument Cluster (IC) module
- Instrument Cluster (IC) software and calibrations
- Vehicle wheelbase longer than originally released

Certain modification could cause reduced system performance, up to and including the complete loss of TPMS functionality. This may include:

- Non-OEM wheels or tires
- The addition of steel carcass or run-flat tires
- Modification of the vehicle's recommended tire pressure
- Lengthening of the vehicle's wheelbase may affect signal strength of the sensors to a point where the rear sensors can no longer be heard by the TPM module. (Vehicles certified at released wheelbases only)
- The addition of metallic structures, such as prisoner partitions, may affect the signal strength of the sensors and could interfere or prevent the TPM module from hearing the rear sensors.
- The addition of intended or unintended transmitters to the vehicle may affect the signal strength of the sensors or interfere with the TPM module's antenna

The TPMS, as delivered from the Ford Motor Company, complies with part 15 of the FCC rules and with RS-210 of Industry Canada. Operation is subject to the following 2 conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

Using Snow Tires and Traction Devices

NOTE:
Snow tires must be the same size and grade as originally equipped on your vehicle.

The tires on your vehicle have all-weather tread to provide traction in the rain and snow; however, in some climates, using snow tires or traction devices may be necessary.

Follow these guidelines when using snow tires and traction devices:

- SAE Class "S" cables should ONLY be used on the vehicle front tires.
- Install cables or chains securely, verifying that the cables or chains do not touch any wiring or brake lines.
- Drive cautiously! If you hear the cables or chains rub or bang against the vehicle, stop and retighten them. If this does not work, remove the cables or chains to prevent vehicle damage.
- Avoid overloading your vehicle.
- Remove the cables or chains when they are no longer needed. Do not use cables or chains on dry roads.
- Do not exceed 48 km/h (30 mph) with tire cables or chains on your vehicle.

Consult your dealer for information on other Ford approved methods of traction control.

Section 1: General Information

Vehicle Loading

⚠ **WARNING:**

The appropriate loading capacity of your vehicle can be limited either by volume capacity (how much space is available) or by payload capacity (how much weight the vehicle should carry). Once you have reached the maximum payload of your vehicle, do not add more cargo, even if there is space available. Overloading or improperly loading your vehicle can contribute to the loss of vehicle control and vehicle rollover.

⚠ **WARNING:**

Exceeding the Safety Compliance Certification Label axle and/or vehicle weight rating limits could result in substandard vehicle handling or performance, engine, transmission and/or structural damage, serious damage to the vehicle, loss of control and personal injury.

Gross vehicle weight rating (GVWR) is the maximum allowable weight of the fully loaded vehicle (including all options, equipment, passengers and cargo). The GVWR is shown on the Safety Compliance Certification Label located on the B-pillar or the edge of the driver's door.

Gross axle weight rating (GAWR) is the maximum allowable weight that can be carried by a single axle (front or rear). These numbers are shown on the Safety Compliance Certification Label located on the B-pillar or the edge of the driver's door. The total load on each axle must never exceed its GAWR.

⚠ **WARNING:**

Do not use replacement tires with lower load carrying capacities than the original tires because they may lower the vehicle's gross vehicle weight rating (GVWR) and gross axle weight rating (GAWR) limitations. Replacement tires with a higher limit than the originals do not increase the GVWR and GAWR limitations.

Steps for determining the correct load limit:

- Locate the statement "The combined weight of occupants and cargo should never exceed XXX kg or XXX lb" on your vehicle's placard.
- Determine the combined weight of the driver and passengers that will be riding in your vehicle.
- Subtract the combined weight of the driver and passengers from XXX kg or XXX lb.
- The resulting figure equals the available amount of cargo and luggage load capacity. For example, if the "XXX" amount equals 1,400 lb and there will be five 150 lb passengers in your vehicle, the amount of available cargo and luggage load capacity is 650 lb (1400 - 750 (5 x 150) = 650 lb). In metric units (635 - 340 (5 x 68) = 295 kg).
- Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity calculated in the step above.

Ambient Temperature Change and Tire Pressure

NOTICE:

Do not inflate tire higher than maximum pressure stamped on tire sidewall. Premature tire wear or damage to the tire may result.

Tire pressures fluctuate with temperature changes. For this reason, tire pressure must be set to specification when tires are at outdoor ambient temperatures. If the vehicle is allowed to warm up to shop temperatures, and the outside temperature is less than shop temperature, the tire inflation pressure must be adjusted accordingly.

If the tires are inflated to specification at shop temperatures, and the vehicle is moved outdoors when the outdoor ambient temperature is significantly lower, the tire pressure may drop enough to be detected by the TPMS and activate the TPMS warning lamp.

As the ambient temperature decreases by 6°C (10°F), tire pressure decreases 7 kPa (1 psi). Adjust the tire pressure by 7 kPa (1 psi) for each 6°C (10°F) ambient temperature drop as necessary to keep the tire at the specified vehicle certification label pressure. Refer to the following tables to adjust the tire pressure indoors for colder outside temperatures.

Section 1: General Information

Table 1. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature[1]

**** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall. ****

Table is based on a Garage Temperature of 70˚F. Max Pressure Adjustment is 7 psi.

Outside Temperature (˚F)	Tire Placard Pressure (PSI)																	
	30	32	34	35	38	40	41	42	45	50	55	60	65	70	75	80	85	90
70	30	32	34	35	38	40	41	42	45	50	55	60	65	70	75	80	85	90
60	31	33	35	36	39	41	42	43	46	51	56	61	67	72	77	82	87	92
50	32	34	36	37	40	42	43	44	47	53	58	63	68	73	79	84	89	94
40	33	35	37	38	41	43	44	45	49	54	59	64	70	75	80	86	91	96
30	34	36	38	39	42	44	46	47	50	55	61	66	72	77	82	87	92	97
20	35	37	39	40	43	46	47	48	51	57	62	67	72	77	82	87	92	97
10	36	38	40	41	45	47	48	49	52	57	62	67	72	77	82	87	92	97
0	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-10	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-20	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-30	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-40	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97

Table 2. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature (Metric Units)[1]

**** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall. ****

Table is based on a Garage Temperature of 21˚C. Max Pressure Adjustment is 50 kPa.

Outside Temperature (˚C)	Tire Placard Pressure (kPa)																	
	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
21	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
16	215	230	240	250	270	285	290	295	315	350	385	420	460	495	530	565	600	635
10	220	235	250	255	275	290	295	305	325	365	400	435	470	505	545	580	615	650
4	230	240	255	260	285	295	305	310	340	370	405	440	485	515	550	595	625	660
-1	235	250	260	270	290	305	315	325	345	380	420	455	495	530	565	600	635	670
-7	240	255	270	275	295	315	325	330	350	395	425	460	495	530	565	600	635	670
-12	250	260	275	285	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-18	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-23	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-29	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-34	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-40	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670

[1] **When Outside (Ambient) Temperature is greater than 21˚C (70˚F), Inflate tires to placard pressure.**

[1] **Use the table to adjust tire pressure for P-metric and LT tires only.**

N0072166

Ride Height Measurement — Front

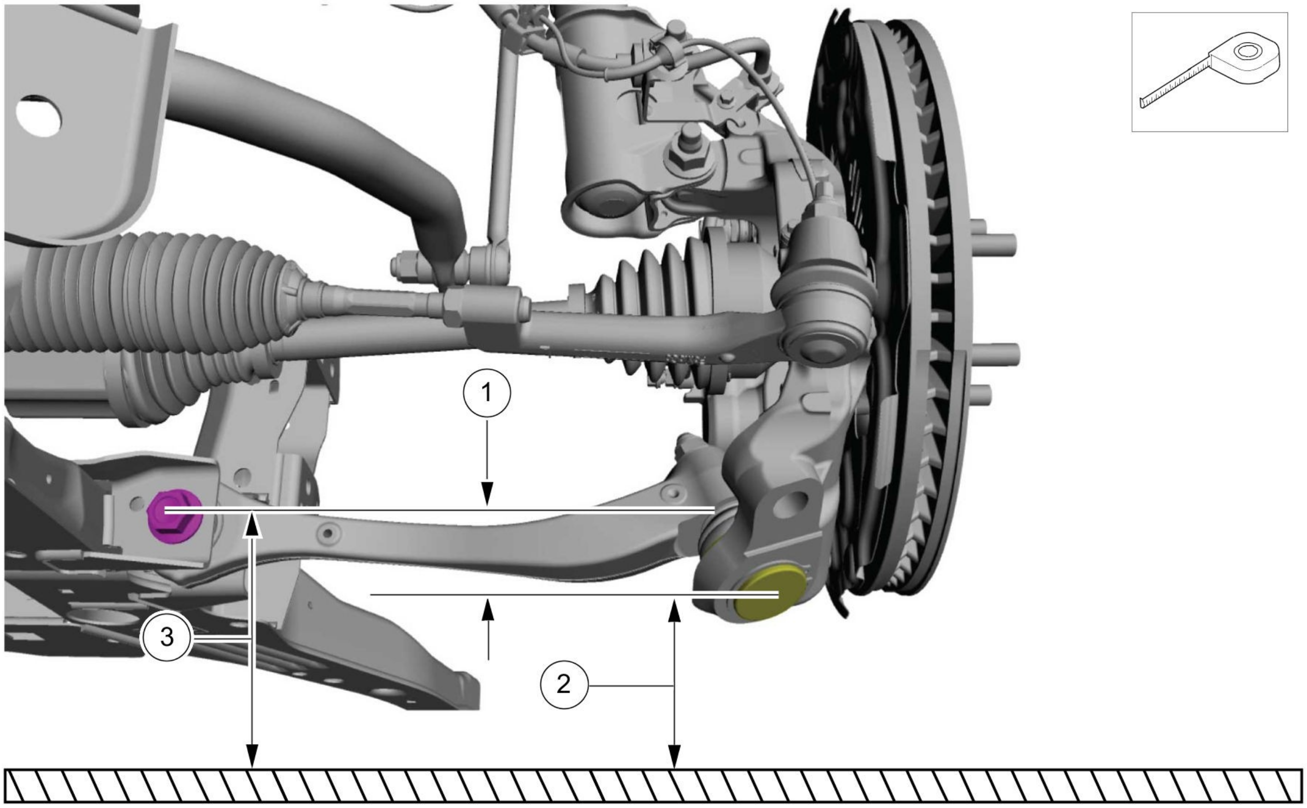
1. **NOTE:**
   Make sure that the vehicle is positioned on a flat, level surface.

   Jounce front and rear suspension vigorously to allow the vehicle to settle.
2. Before measuring ride height check:
   a. Tires are inflated to the correct pressure.
   b. Vehicle should have at least one-half tank of fuel.
   c. All fluids at proper levels.
   d. No cargo inside the cab or bed.
   e. Inspect for aftermarket equipment. Check for aftermarket changes to the steering, suspension, wheel and tire components (such as competition, heavy duty, etc.).

Section 1: General Information

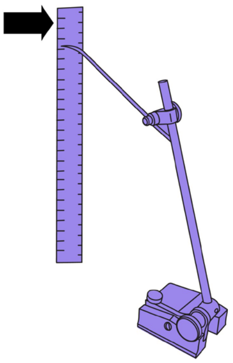
3. Ride height = 3–2 (Use the General Equipment: Surface Gauge)

   - Measure the distance between the flat level surface and the center of the rear control arm ball joint cap. (measurement 2)
   - Measure the distance between the flat level surface and the center of the rear control arm inboard bolt. (measurement 3)



N0179854

4. With the surface gauge positioned on a flat, level surface, record the measurement of the surface gauge position (measurement 2) and (measurement 3).



E145760

5. Subtract measurement 2 from measurement 3 to obtain the front ride height.

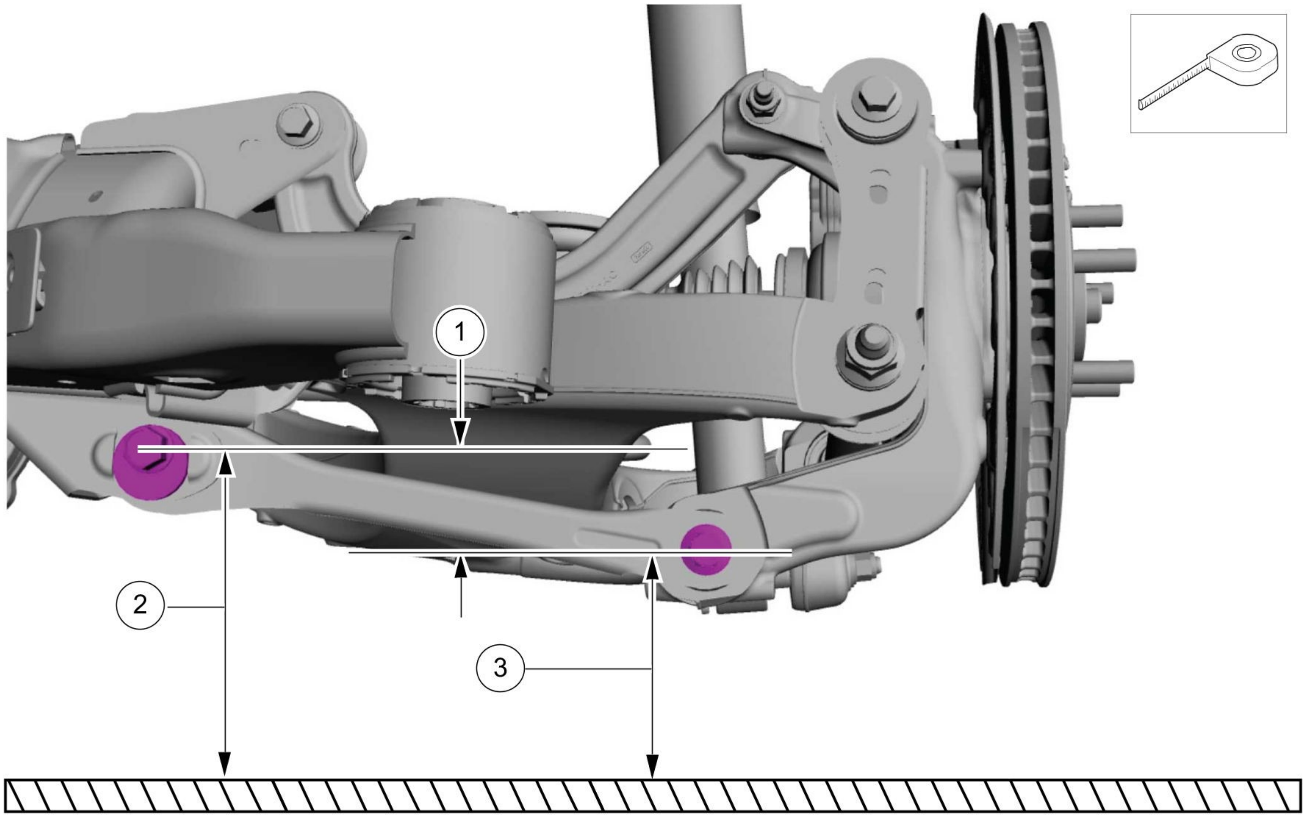
Section 1: General Information

Ride Height Measurement — Rear

1. **NOTE:**
   Make sure that the vehicle is positioned on a flat, level surface, transmission in the PARK position and the parking brake OFF.

   Jounce front and rear suspension vigorously to allow the vehicle to settle.
2. Before measuring ride height check:
   a. Tires are inflated to the correct pressure.
   b. Vehicle should have at least one-half tank of fuel.
   c. All fluids at proper levels.
   d. No cargo inside the cab or bed.
   e. Inspect for aftermarket equipment. Check for aftermarket changes to the steering, suspension, wheel and tire components (such as competition, heavy duty, etc.).
3. Ride height = 2–3 (Use the General Equipment: Surface Gauge)

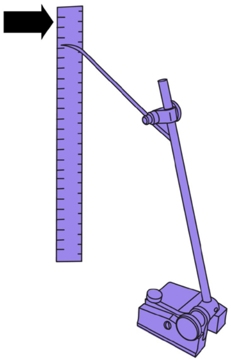
- Measure the distance between the flat level surface and the center of the toe link inboard cam bolt. (measurement 2)
- Measure the distance between the flat level surface and the center of the toe link outboard bolt. (measurement 3)



N0179855

4. With the surface gauge positioned on a flat, level surface, record the measurement of the surface gauge position (measurement 2) and (measurement 3).

Section 1: General Information



E145760

5. Subtract measurement 3 from measurement 2 to obtain the rear ride height.

Ride Height Specifications

NOTE:
Base Police ride height at full fuel, as-built at CAP, no additional content.

Ride Height

Item	Specification
120-in wheelbase, 3.0L GTDI	
Front	51.9 mm (2.043 in) ± 12 mm (0.472 in)
Rear	51.6 mm (2.031 in) ± 10 mm (0.393 in)
120-in wheelbase, 3.3L	
Front	61.1 mm (2.405 in) ± 12 mm (0.472 in)
Rear	62.3 mm (2.295 in) ± 10 mm (0.393 in)
120-in wheelbase, 3.3L HEV	
Front	61.1 mm (2.405 in) ± 12 mm (0.472 in)
Rear	62.3 mm (2.295 in) ± 10 mm (0.393 in)

Table of Contents

Contents **PAGE**

Section 2: High Voltage Battery Depowering 2-2

Section 2: High Voltage Battery Depowering

Section 2: High Voltage Battery Depowering

High Voltage Battery Depowering

⚠ WARNING:

THE HIGH-VOLTAGE SYSTEM MAY RETAIN A DANGEROUS LEVEL OF VOLTAGE FOR A SHORT TIME AFTER THE SERVICE DISCONNECT HAS BEEN OPENED. WAIT 5 MINUTES FOR THE VOLTAGE TO DISSIPATE BEFORE BEGINNING SERVICE. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

⚠ WARNING:

REMOVING THE BATTERY HIGH VOLTAGE SERVICE DISCONNECT DOES NOT DISSIPATE VOLTAGE INSIDE THE BATTERY PACK. THE BATTERY PACK REMAINS LIVE AND DANGEROUS. CONTACT WITH THE HIGH VOLTAGE BATTERY PACK INTERNALS MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

⚠ WARNING:

ELECTRIC VEHICLES DAMAGED BY A CRASH MAY HAVE COMPROMISED HIGH VOLTAGE SAFETY SYSTEMS AND PRESENT A POTENTIAL HIGH VOLTAGE ELECTRICAL SHOCK HAZARD. EXERCISE CAUTION AND WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE) INCLUDING HIGH VOLTAGE SAFETY GLOVES AND BOOTS. REMOVE ALL METALLIC JEWELRY, INCLUDING WATCHES AND RINGS. ISOLATE THE HIGH VOLTAGE SYSTEM AS DIRECTED BY THE FORD EMERGENCY RESPONSE GUIDE FOR THE VEHICLE. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

⚠ WARNING:

TO PREVENT THE RISK OF HIGH-VOLTAGE SHOCK, ALWAYS FOLLOW PRECISELY ALL WARNINGS AND SERVICE INSTRUCTIONS INCLUDING INSTRUCTIONS TO DEPOWER THE SYSTEM. THE TOTAL VOLTAGE OF THE VEHICLE HV BATTERY PACK MAY BE UP TO APPROXIMATELY 450 VOLTS DC. THIS VOLTAGE IS PROVIDED THROUGH HIGH-VOLTAGE CABLES TO ITS COMPONENTS AND MODULES. THE HIGH-VOLTAGE CABLES AND WIRING ARE IDENTIFIED BY ORANGE HARNESS TAPE OR ORANGE WIRE COVERING. ALL HIGH-VOLTAGE COMPONENTS ARE MARKED WITH HIGH-VOLTAGE WARNING LABELS WITH A HIGH-VOLTAGE SYMBOL. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

⚠ WARNING:

SERVICE OF THE HIGH VOLTAGE SYSTEM ON THIS VEHICLE IS RESTRICTED TO QUALIFIED PERSONNEL. THE REQUIRED QUALIFICATIONS VARY BY REGION. ALWAYS OBSERVE LOCAL LAWS AND LEGISLATIVE DIRECTIVES REGARDING ELECTRIC VEHICLE SERVICE. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

⚠ WARNING:

NEVER CONNECT THE SERVICE DISCONNECT WHEN A HIGH-VOLTAGE COVER IS REMOVED. ALWAYS INSTALL THE COVER PRIOR TO CONNECTING THE SERVICE DISCONNECT. THE COVER PREVENTS INADVERTENT CONTACT WITH THE HIGH VOLTAGE WHICH IS PRESENT AT SEVERAL POINTS UNDER THE COVER. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

⚠ WARNING:

DISCONNECT THE 12V BATTERY BEFORE SERVICING THE DIRECT CURRENT TO ALTERNATING CURRENT (DC-AC) INVERTER OR ALTERNATING CURRENT (AC) POWERPOINT TO PREVENT THE RISK OF HIGH VOLTAGE SHOCK. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN SERIOUS PERSONAL INJURY.

NOTICE:

Do not backprobe, splice or repair the high voltage (orange) wiring. Voltage in the system is approximately 450 volts DC. Damage may occur to equipment added to the system.

NOTICE:

None of the High Voltage Traction Battery (HVTB) wiring should be tapped or spliced to check for battery voltage (power), ground or signals.

Section 2: High Voltage Battery Depowering

NOTICE:

Modification of Low-Voltage (LV) power & control wires connecting to the High-Voltage (HV) battery system can damage or disable the HV Battery system. Do not open or modify High Voltage battery pack

High Voltage Battery Depowering using FDRS

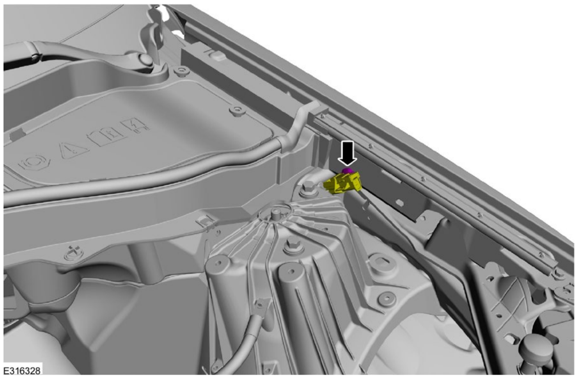
⚠ **WARNING:**

Before beginning any service procedure in this manual, refer to health and safety warnings in Workshop Manual (WSM) Section 100-00 General Information. Failure to follow this instruction may result in serious personal injury.

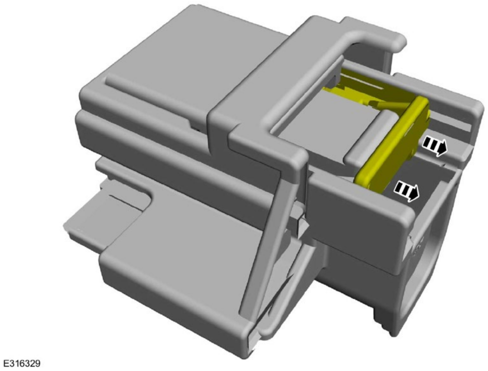
⚠ **WARNING:**

To prevent the risk of high-voltage shock, always follow precisely all warnings and service instructions, including instructions to depower the system. The high-voltage system utilizes approximately 450 volts DC, provided through high-voltage cables to its components and modules. The high-voltage cables and wiring are identified by orange harness tape or orange wire covering. All high-voltage components are marked with high-voltage warning labels with a high-voltage symbol. Failure to follow these instructions may result in serious personal injury or death.

1. Using the FDRS CARRY OUT the Zero Voltage Confirmation routine and follow the on-screen instructions.
2. Detach the pin-type retainer and position the electrical connector and wiring harness aside.



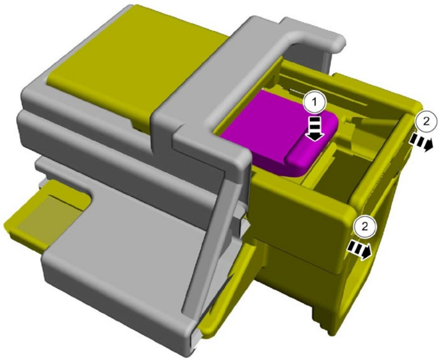
3. Release the Connector Position Assurance (CPA) clip.



4. **NOTE:**
   The tab must be depressed prior to pushing the connector back in or damage to the connector may result.

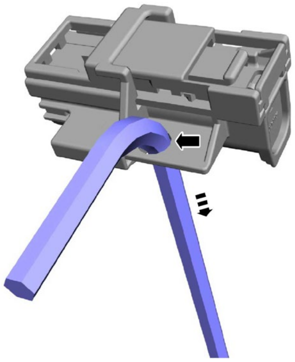
   Depress the tab while pulling the connector until the hole is completely visible on the top of the connector.

Section 2: High Voltage Battery Depowering



E316330

5. Insert a suitable tool inside the connector hole to prevent the connector from closing.



E316331

6. Using the FDRS COMPLETE the Zero Voltage Confirmation routine and verify the High Voltage System has been de-energized.

Manual De-Energizing

⚠ **WARNING:**

To prevent the risk of high-voltage shock, always follow precisely all warnings and service instructions, including instructions to depower the system. The high-voltage system utilizes approximately 450 volts DC, provided through high-voltage cables to its components and modules. The high-voltage cables and wiring are identified by orange harness tape or orange wire covering. All high-voltage components are marked with high-voltage warning labels with a high-voltage symbol. Failure to follow these instructions may result in serious personal injury or death

⚠ **WARNING:**

Before beginning any service procedure in this manual, refer to health and safety warnings in WSM Section 100–00 General Information. Failure to follow this instruction may result in serious personal injury.

NOTICE:

Manual De-energization should only be performed when a Ford-specific diagnostic tool is not available.

NOTICE:

Excessive use of this method may cause damage to electrical connectors.

NOTICE:

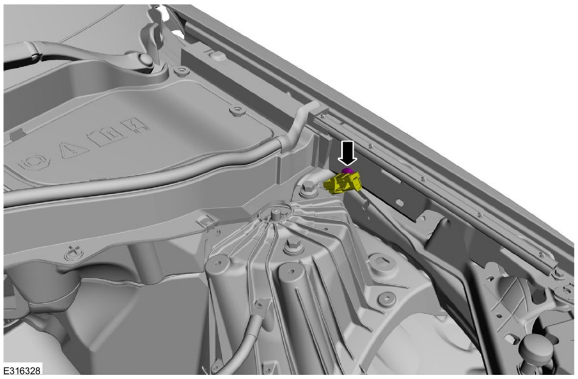
To prevent the risk of high voltage shock, the high voltage battery cover must not be removed if any of the following condition exist:

- **BECM DTC P0AA6:00 that has been diagnosed to be an internal fault with the high voltage Battery.**
- **BECM Diagnostic Trouble Codes (DTCs) P0AA1:00 AND P0AA4:00 are present.**
- **BECM Diagnostic Trouble Codes (DTCs) P0D0F:00 AND P0AA4:00 are present (PHEV only).**

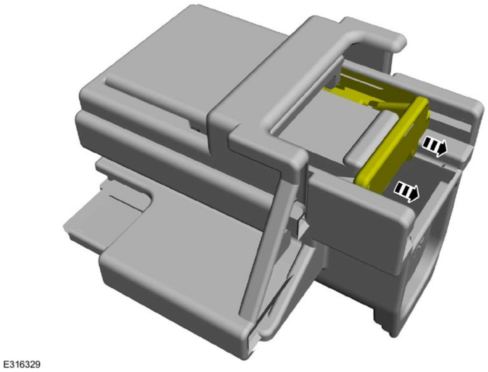
Section 2: High Voltage Battery Depowering

1. Disconnect the Electric Vehicle Supply Equipment (EVSE) from the vehicle charge port. (PHEV only).
2. Turn the ignition ON without depressing the brake pedal (Accessory mode).
3. **NOTE:**
   A scan tool that is capable of performing a self-test on the BECM is required.

   Using a scan tool perform BECM self test and record the Diagnostic Trouble Codes (DTCs).
   •If BECM Diagnostic Trouble Codes (DTCs) P0AA1:00 AND P0AA4:00 are present. Refer to WSM procedures in section 414-03 High Voltage Battery, Mounting and Cables, Diagnosis and Testing.
   •If BECM Diagnostic Trouble Codes (DTCs) P0D0F:00 AND P0AA4:00 are present (PHEV only). Refer to WSM Procedures in section 414–03A High Voltage Battery, Mounting and Cables - Plug-In Hybrid Electric Vehicle (PHEV).
4. Turn the ignition OFF.
5. Detach the pin-type retainer and position the electrical connector and wiring harness aside.



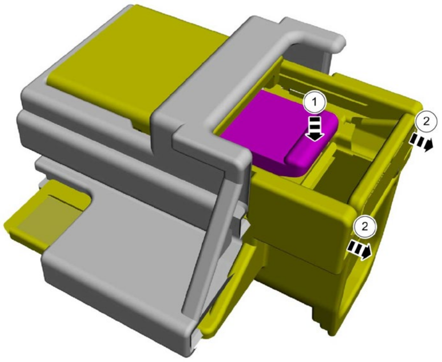
6. Release the Connector Position Assurance (CPA) clip.



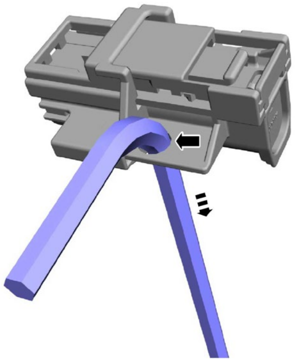
7. **NOTE:**
   The tab must be depressed prior to pushing the connector back in or damage to the connector may result.

   Depress the tab while pulling the connector until the hole is completely visible on the top of the connector.

Section 2: High Voltage Battery Depowering



8. Insert a suitable tool inside the connector hole to prevent the connector from closing.



9. Disconnect the low voltage electrical connector at the High Voltage Battery.
10. Disconnect the high voltage electrical connector at the High Voltage Battery.
11. Wait a minimum of 5 minutes.

Table of Contents

Contents **PAGE**

Section 3: General Electrical Information 3-2
  Electrical Basics 3-2
  Control Modules — Red Area 3-2
  Controller Area Network (CAN) Bus 3-2
  General Guidelines For Vehicle Modification 3-2
  Auxiliary Power Point — 12V 3-4
  DC/DC Converter 3-4
  Vehicle Component Electrical Loads 3-4
  Police Interceptor Utility Hybrid— Rear Power Access 3-5
  Access to Signals and Power 3-9
  Wig Wag 3-11

Section 3: General Electrical Information

Section 3: General Electrical Information

Electrical Basics

Throughout a vehicle, electricity is supplied through "hot" wires, comparable to the pressurized supply pipes of a plumbing system. At various points along the wires are electrical loads in the form of lights, switches and receptacles. Turning on a light switch is somewhat like opening a faucet to let water run; electricity flows through the hot wire to make the light illuminate. Once the electricity has done its work, its potential drops to zero, just as water loses pressure after flowing through a sink or laundry tub. The electrical system has drains, which are the ground wires that return the electricity to its source, just as a plumbing system has drain pipes through which water runs into the sewer mains or ground.

The lights or equipment, technically called the load, can be compared to a water wheel that remains motionless until a stream of water causes it to turn. A load consists of a resistance, a material that permits the passage of electricity, but only with difficulty and thereby creates heat. Resistance to electricity flowing through a wire can be compared to the resistance given to water flowing through a hose, as if the hose were to be squeezed, it would restrict the flow of water. A load may also be inductive, typically a motor with windings of copper wire, in which the magnetic fields generated by the electrical current creates motion. The tungsten filament of an incandescent bulb or the heating element of an electric heater in a coffee pot would be an example of a resistive load. At any moment, the demand on an electrical system depends on the number of loads in operation and their consumption of energy, just as demands on a water system depend on how many faucets are opened and how wide they are opened.

The mechanics and physical fittings of the system are simple. Electricity moves throughout the vehicle in wires of different sizes, according to the electricity a circuit may have to carry.

Electrical Terms

VOLT is the unit of electrical potential, equal to the difference of electrical potential between 2 points in a circuit. It could be compared to the pressure, or the push, on the water to move it through a pipe.

AMPERE or **AMPS** is the unit used to measure the amount of electrical flow; the number of electrically charged particles called electrons that flow past a given point in a circuit. It is similar to measuring the amount of water flowing through a pipe at any given point. The larger the pipe is, the more water that can flow past one given point per second. Similarly, the bigger the wire is, the more electricity that can flow past a given point.

WATT is the unit of power. It indicates the rate at which a device converts electric current to another form of energy, either heat or motion. Or to put it another way, the rate at which a device converts energy.

The relationship of volts, amperes and watts to one another is expressed in a simple equation that enables you to make any calculations you may need for proper and safe electrical modifications to the vehicle. Volts x Amps = watts. If the current is at 12 volts and a device requires 4 amperes of current, the equation will read 12 volts x 4 amperes = 48 watts.

To figure the current needed for a device rated in watts, turn the equation around: Watts/volts = amperes. For example, if you have a piece of equipment, such as a communications radio, that uses 120 watts: 120 watts/12 volts = 10 amperes.

Control Modules — Red Area

Do not install any components into the control modules or module harness. Connecting into this system may affect control module operation. For example, connecting aftermarket electrical equipment into the brake light circuit or any other circuit which is connected to the PCM, anti-lock brake computer, airbag system or any other vehicle system will cause vehicle malfunction.

Controller Area Network (CAN) Bus

NOTICE:
Wiring faults in the Controller Area Network (CAN) bus may shut down the vehicle and prevent further operation.

Do not splice or connect any equipment to the CAN bus wiring.

General Guidelines For Vehicle Modification

- Provide circuit protection (fuses) for all wiring. The fuse rating should not exceed either the rated wiring current capacity or the total current requirements for all the add-on components on the circuit. Install fuses as close to the point of tapped power as possible.
- Document all revisions to the electrical system and place with the vehicle Owner's Literature. Color code and/or label all revisions or additions to wiring.
- Provide protective covering in all areas that could be damaged during normal equipment installations.
- Disconnect the negative battery cable of vehicles stored on site to reduce the possibility of draining the battery by lights or other equipment.
- Do not allow control panels attached to the instrument panel to protrude into the driver and passenger air bag deployment zones. For additional information, refer to Section 5: Reference Information in this guide.

Section 3: General Electrical Information

- Do not install switches and gauges in the driver or passenger knee impact areas.
- Inspect all Ford gauges, lights and switches for correct operation after instrument panel work is performed.
- Properly secure any relocated or removed wiring while working behind the instrument panel to prevent chafing, squeaks and rattles.
- Provide adequate retention for wiring harnesses so that they are clear of bolts, corners or edges which could abrade the wires during normal vehicle operation.
- Anticipate incorrectly routed wiring situations and protect all wiring from penetration by screws and raw edges.
- Weather-seal all electrical connectors exposed to the elements.
- Do not use quick splice connectors or wire nuts.
- Install the fuse panel so fuses are readily accessible.
- Make sure that connections are easily accessible for assembly and service.
- Make sure submersible connectors do not lose their seals under extreme assembly conditions such as bending wires 90 degrees immediately after the connector.
- Whenever using connectors, use a socket (female) connector on the electrical source side and a plug (male) connector on the electrical load side to reduce the possibility of a short circuit when disconnected.
- Air bag restraint systems must remain intact as received from Ford Motor Company. Before any vehicle modifications are performed, the system must be disarmed by following the instructions provided in the current Workshop Manual.
- Adherence to the above guidelines is not to be construed as approval by Ford Motor Company of any specific revisions or additions to the vehicle's original electrical system.
- Do not modify the cooling system. High voltage vehicle components may be damaged if any cooling system modifications are attempted.
- Do not backprobe, splice or repair the high voltage system (orange) wiring/cables.
- Do not mount to or modify the high voltage system (orange) wiring/cables in any way.
- Do not cut, weld or screw into the HVTB case or penetrate the batteries in any way.
- Provide circuit protection (fuses) for all wiring. The fuse rating should not exceed either the rated wiring current capacity or the total current requirements for all the add-on components on the circuit. Install fuses as close to the point of tapped power as possible.
- Provide protective covering in all areas that could be damaged during normal equipment installations.
- Do not allow control panels attached to the instrument panel to protrude into the driver and passenger air bag deployment zones. For additional information, refer to Section 4: Reference in this guide.
- Do not install switches and gauges in the driver or passenger knee impact areas.
- Provide adequate retention for wiring harnesses so they are clear of bolts, corners or edges which could abrade the wires during normal vehicle operation.
- Properly secure all wiring relocated or removed while working behind the instrument panel to prevent chafing, squeaks and rattles.
- Anticipate mis-routed wiring situations and protect all wiring from penetration by screws and raw edges.
- Weather-seal all electrical connectors exposed to the elements.
- Do not use quick splice connectors or wire nuts.
- Install the fuse panel so fuses are readily accessible.
- Make sure that connections are easily accessible for assembly and service.
- Inspect all Ford gauges, lights and switches for correct operation after instrument panel work is performed.
- Make sure submersible connectors do not lose their seals under extreme assembly conditions such as bending wires 90 degrees immediately after the connector.
- Whenever using connectors, use a socket (female) connector on the electrical source side and a plug (male) connector on the electrical load side to reduce the possibility of a short circuit when disconnected.
- Adherence to the above guidelines is not to be construed as approval by Ford Motor Company of any specific revisions or additions to the vehicles original electrical system.
- Document all revisions to the electrical system and place with the vehicle Owner's Literature. Color code and/or label all revisions or additions to wiring.
- Disconnect the negative battery cable of vehicles stored on-site to reduce the possibility of draining the battery by lights or other equipment.

12 Volt Battery

The 12 volt battery is a standard automotive battery. It is a DC source connected in a negative ground system. The battery case is sealed, with 2 vent holes to release gases. The battery has 3 major functions:

- Storage of electricity for later use
- Voltage stabilizer for the electrical system
- Temporary power source when electrical loads exceed the Direct Current/Direct Current (DC/DC) converter output current.
- Only use the 12 volt (Low Voltage) power point provided in the cargo area on the passenger side under the cargo area floor. NEVER use the High Voltage Hybrid battery to supply power for law enforcement equipment.

Section 3: General Electrical Information

Auxiliary Power Point — 12V

⚠ **WARNING:**
The nominal high voltage traction battery (HVTB) voltage is 300 volts DC.

⚠ **WARNING:**
The high voltage traction battery (HVTB) and charging system contains high voltage components and wiring. High voltage cables and wiring are orange in color.

⚠ **WARNING:**
Before carrying out any vehicle modifications, the high voltage traction battery (HVTB) must be depowered. Failure to follow these instructions may result in severe personal injury or death.

NOTE:
Do not use the power point for operating the cigarette lighter element (if equipped).

NOTICE:
Power outlets are designed for accessory plugs only. Do not insert any other object into the power outlet as this will damage the outlet and blow the fuse. Do not hang any type of accessory or accessory bracket from the plug. Improper use of the power outlet can cause damage not covered by your warranty.

To prevent the fuse from being blown, do not use the power point(s) over the vehicle capacity of 12-VDC/180W.

To prevent the battery from being discharged, do not use the power point longer than necessary when the engine is not running.

DC/DC Converter

The DC/DC converter is an air-cooled component that converts high voltage DC power to low voltage DC power. It is part of the high voltage battery pack and maintains an electrical isolation between the 2 DC power systems. This system converts the high voltage (approximately 300 volts) to low voltage (12 volts) that provides power to the vehicle low voltage battery systems. The PCM controls the operation of the DC/DC converter through an enabled input from the PCM to the DC/DC converter.

Vehicle Component Electrical Loads

Vehicle component electrical loads are shown in the table below. Not all features are powered all the time, so actual vehicle loads on the power supply system will vary.

NOTE:
The electric A/C compressor loads are included with the blower loads.

Component	Amps
Base	
Miscellaneous base loads	16.5
Cooling	
Cooling fan (high speed variable)	27.0
Climate Control	
A/C fan to face — high speed (recirculating air)	25.0
A/C fan to face — M/H speed (recirculating air)	16.0
Heater fan to foot — M/H speed (fresh air)	16.0
Lighting	
Exterior and instrument panel lamps (non-dimmable)	3.5

Section 3: General Electrical Information

(Continued)

Component	Amps
Headlamps — low beam	9.1
Brake lights (with CHMSL)	5.1
Heated Features	
Heated rear window (includes heated mirrors)	18.0
Heated front seat — LH	4.5
Heated front seat — RH	4.5
Other	
Radio	4.0
Typical Vehicle Load = 95-110 Amps	

Typical Police Equipment

Loads for equipment commonly found on police vehicles are shown in the table below. Not all equipment will be operating at the same time, so actual loads on the power supply system will vary.

Component	Amps
Communications radio	5.0-20.0
Light bar	28.0-43.0
LED light bar	6.0
Siren	15.0-30.0
Headlamp flasher	1.0-1.5
LED deck bars/LED visor lights	2.0
Radar	0.8
Receipt printer	3.0
Spotlights (each)	7.8
Alley lights (each)	1.0
Camcorder	2.0

Police Interceptor Utility Hybrid— Rear Power Access

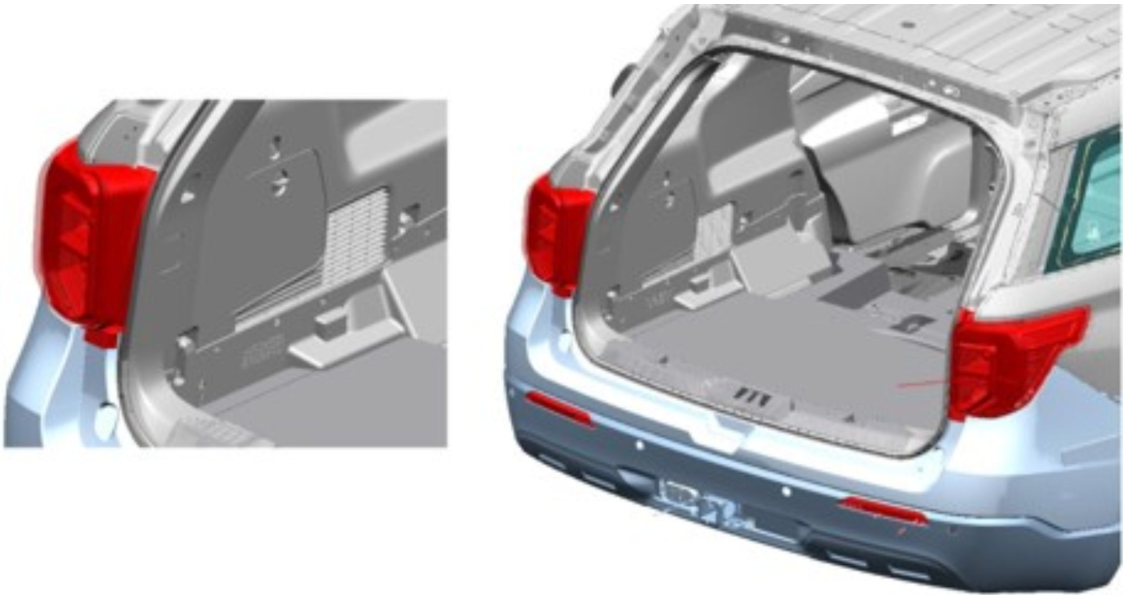
The rear power access point mounted in the cargo area, is a battery access port for police auxiliary equipment. It is capable of supplying 80 amps of battery voltage. Voltage to the positive terminal of the rear power access point is supplied through two 50A, connected to the battery through the power distribution box (PDB) fuses F30 and F31. Battery access is provided by 2 studs contained in an enclosure, behind the passenger second row seat under the cargo area floor. The terminal with the red wire is the battery positive. Remove both fuses in the PDB before removing the cover to the rear power point. Make sure load devices can be turned off and are switched off when reinserting the fuses.

⚠ **WARNING:**

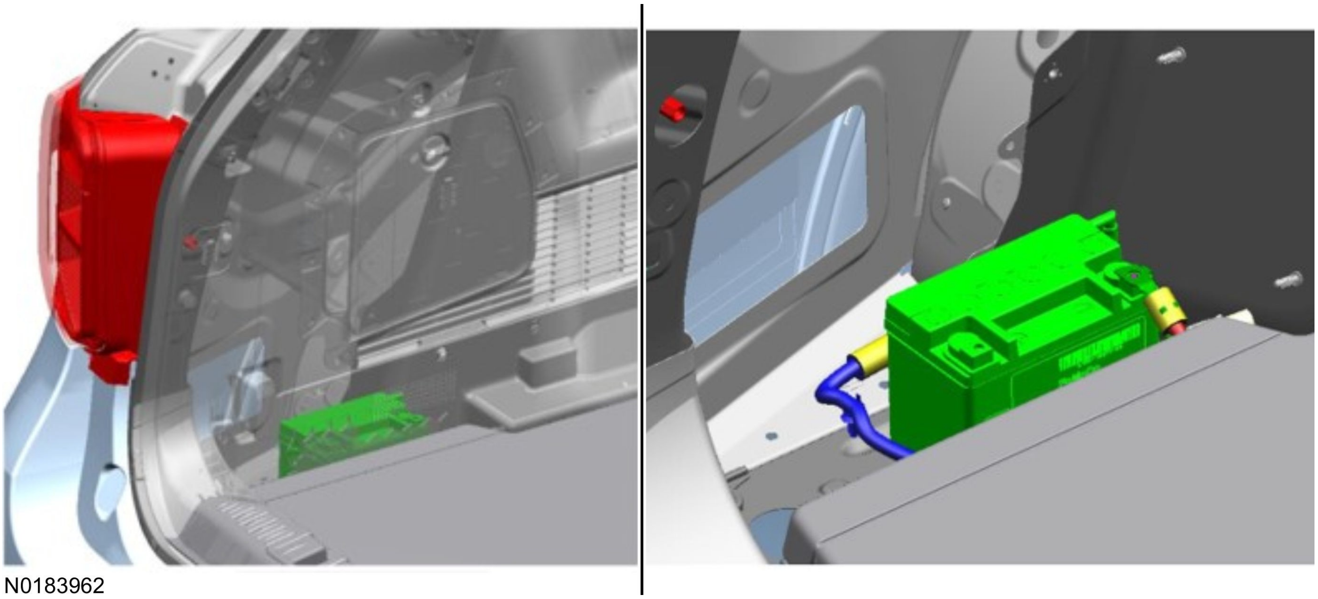
Under no circumstances should the rear power access point cover be removed without first removing power distribution box (PDB) fuses F30 and F31. Removing the cover without removing the fuses could result in an electrical hazard. Turn off load devices before inserting the fuses. Failure to follow these instructions may result in personal injury.

Section 3: General Electrical Information

NOTE:
There is a battery on Hybrid vehicles ONLY in the cargo area on driver side behind the trim panel should NEVER be used as a power source for police equipment and lighting. It is intended for vehicle use ONLY on Hybrid vehicles. This battery does not exist on 3.3L and 3.5L GTDI powertrain vehicles. For upfitting, the power lug on floor in 2nd row below rear portion of seat should be used as the power source for police equipment and lighting.



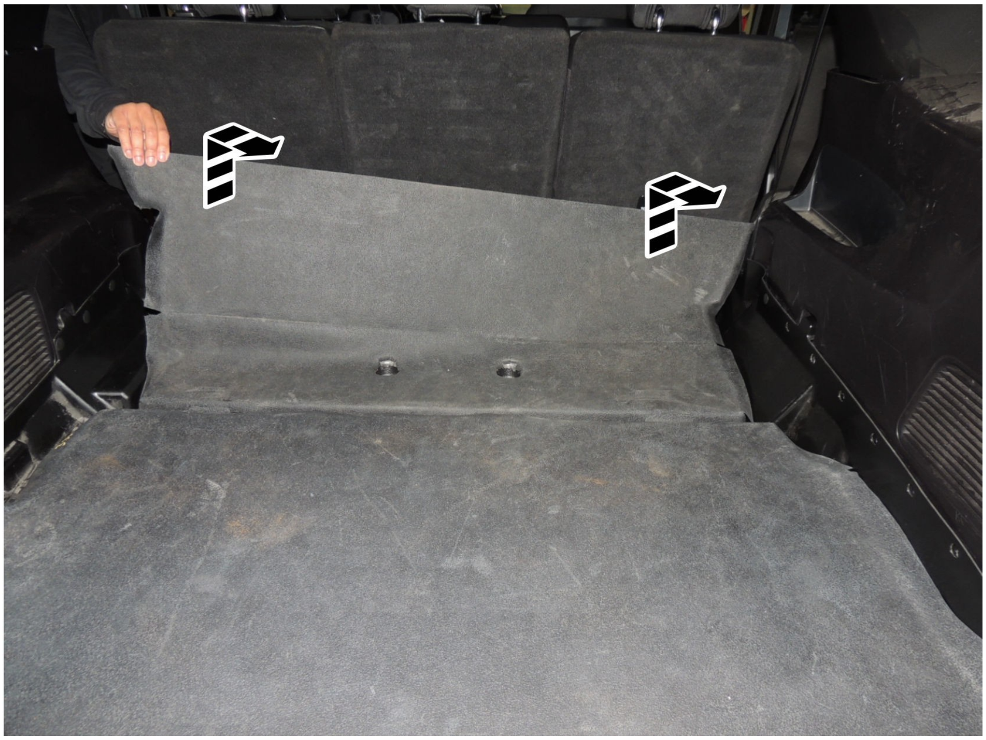
N0183961



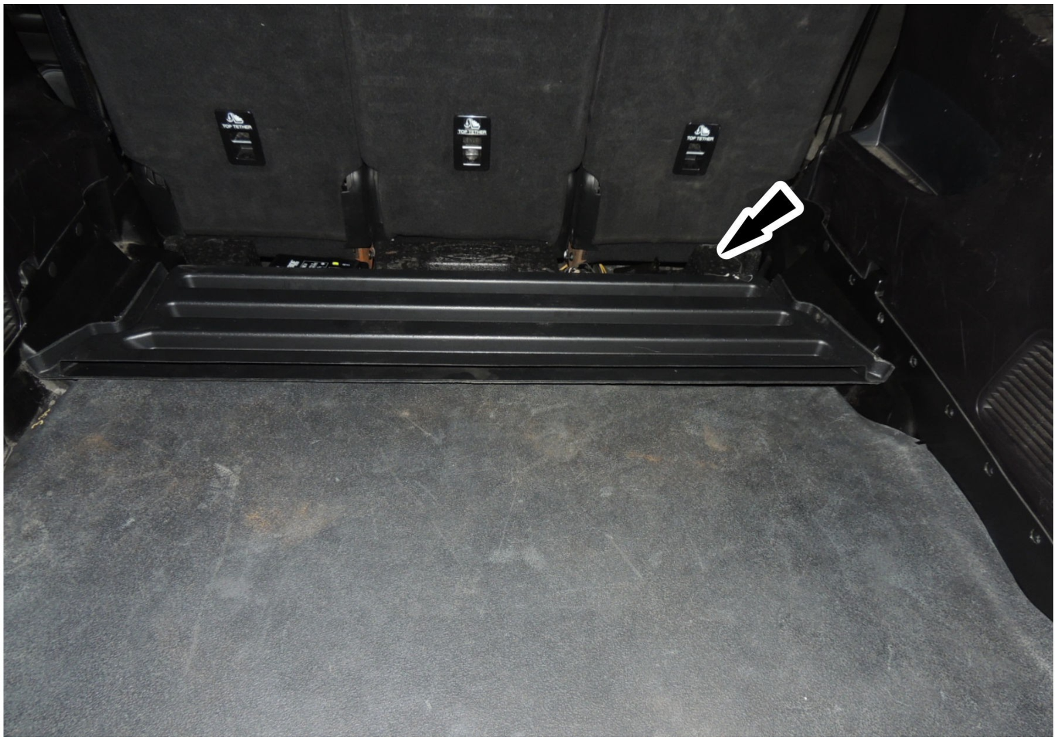
N0183962

Section 3: General Electrical Information

1. To access the rear power point, fold back the cargo area floor near the second row seat.



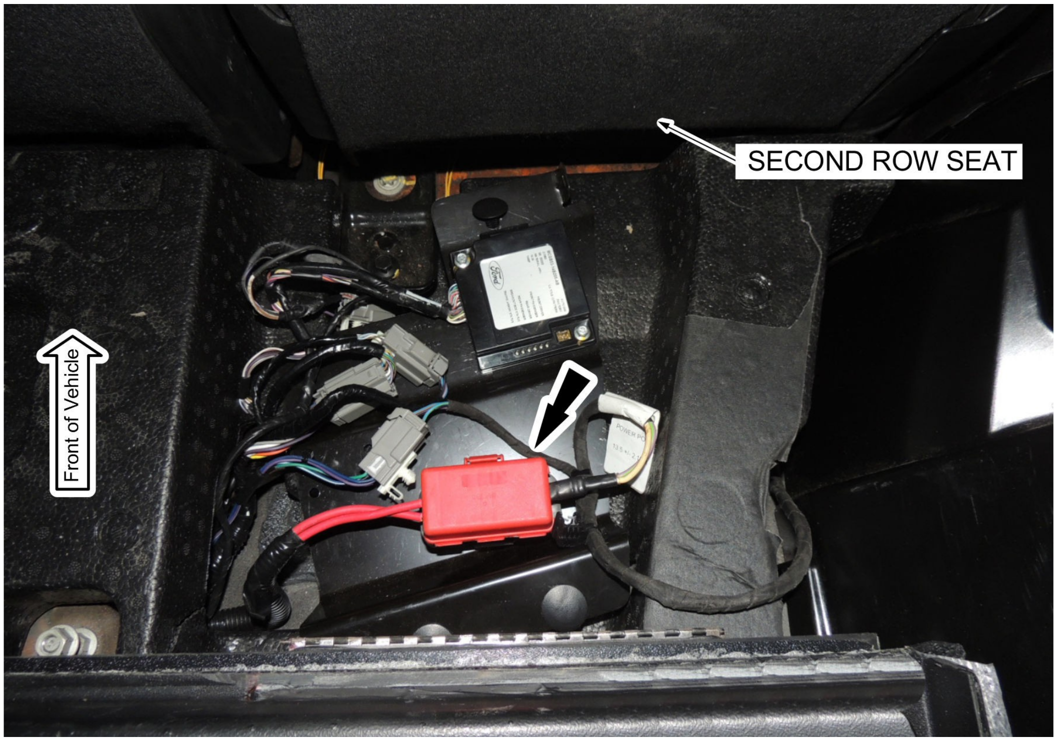
N0179976



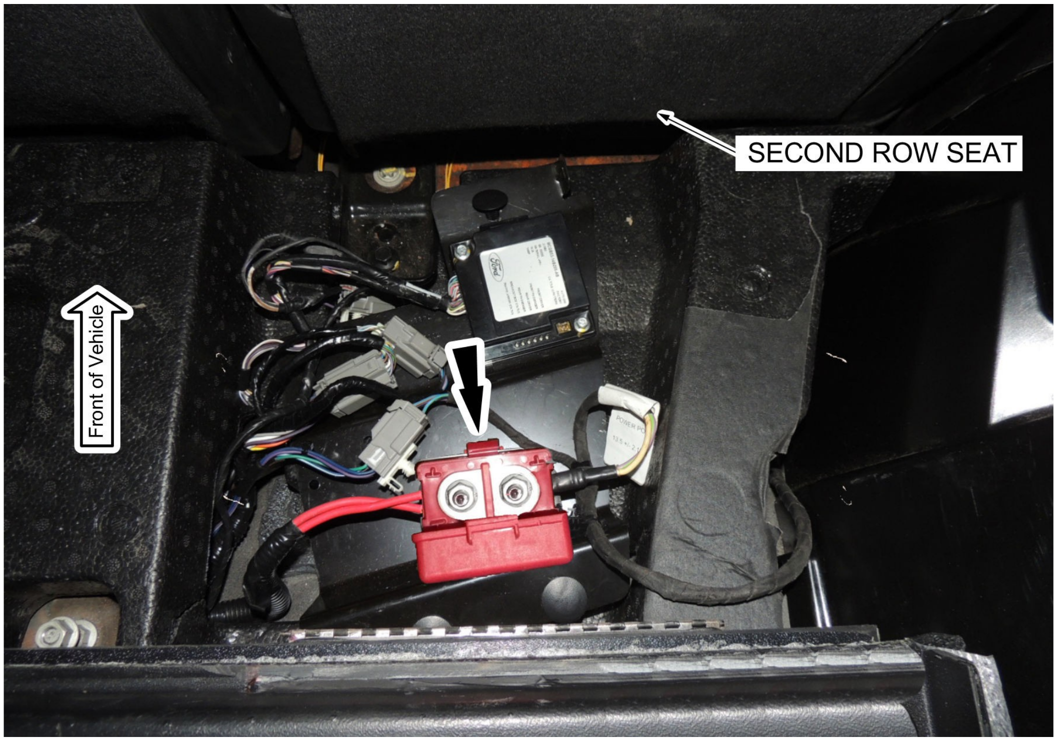
N0179978

Section 3: General Electrical Information

2. Open the cover.


SECOND ROW SEAT
Front of Vehicle

N0180456

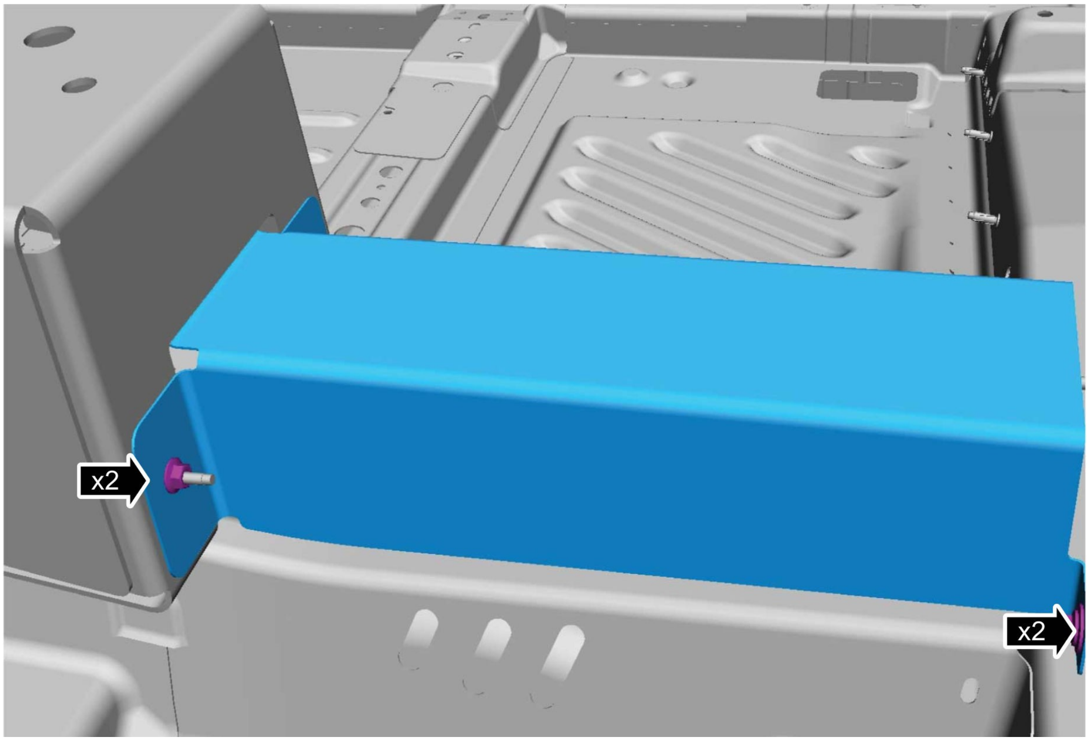

SECOND ROW SEAT
Front of Vehicle

N0180457

Section 3: General Electrical Information

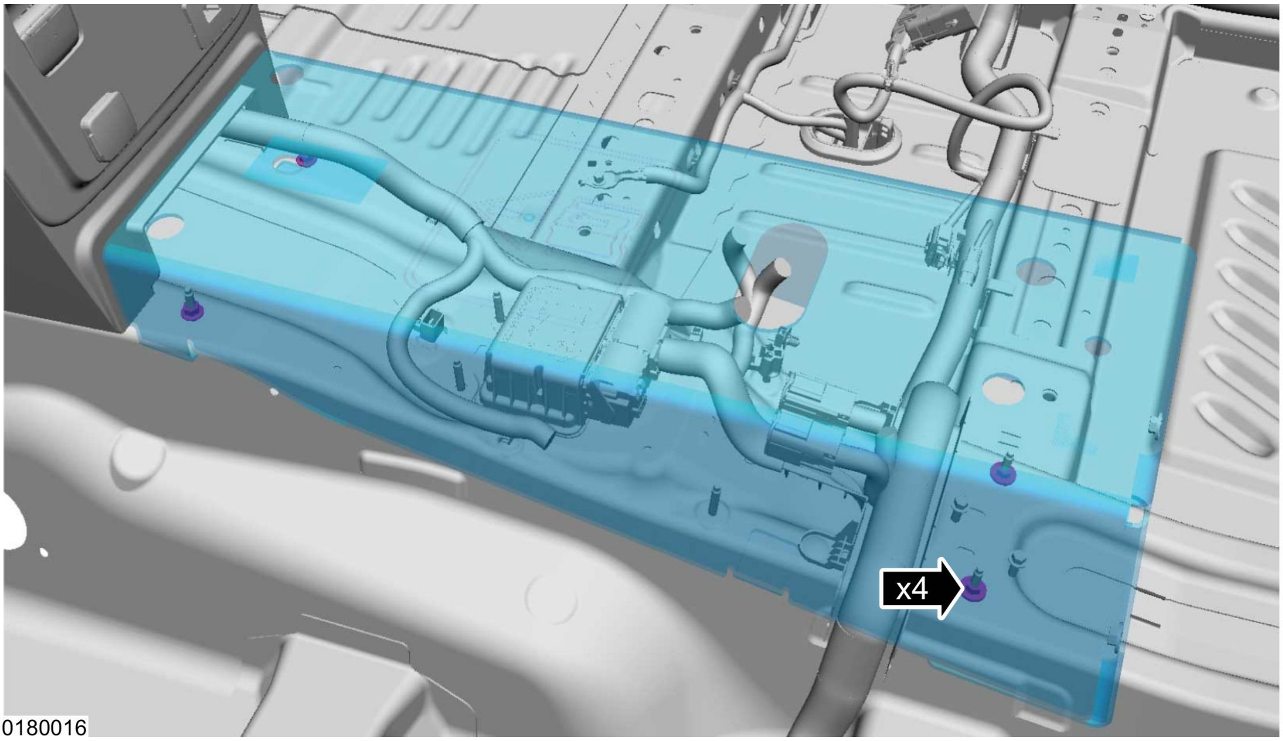
Access to Signals and Power

1. Remove 4 bolts and the rear plate located in between the mounting plate and second row seat.
   a. Torque: 40 lb.in (4.5 Nm)



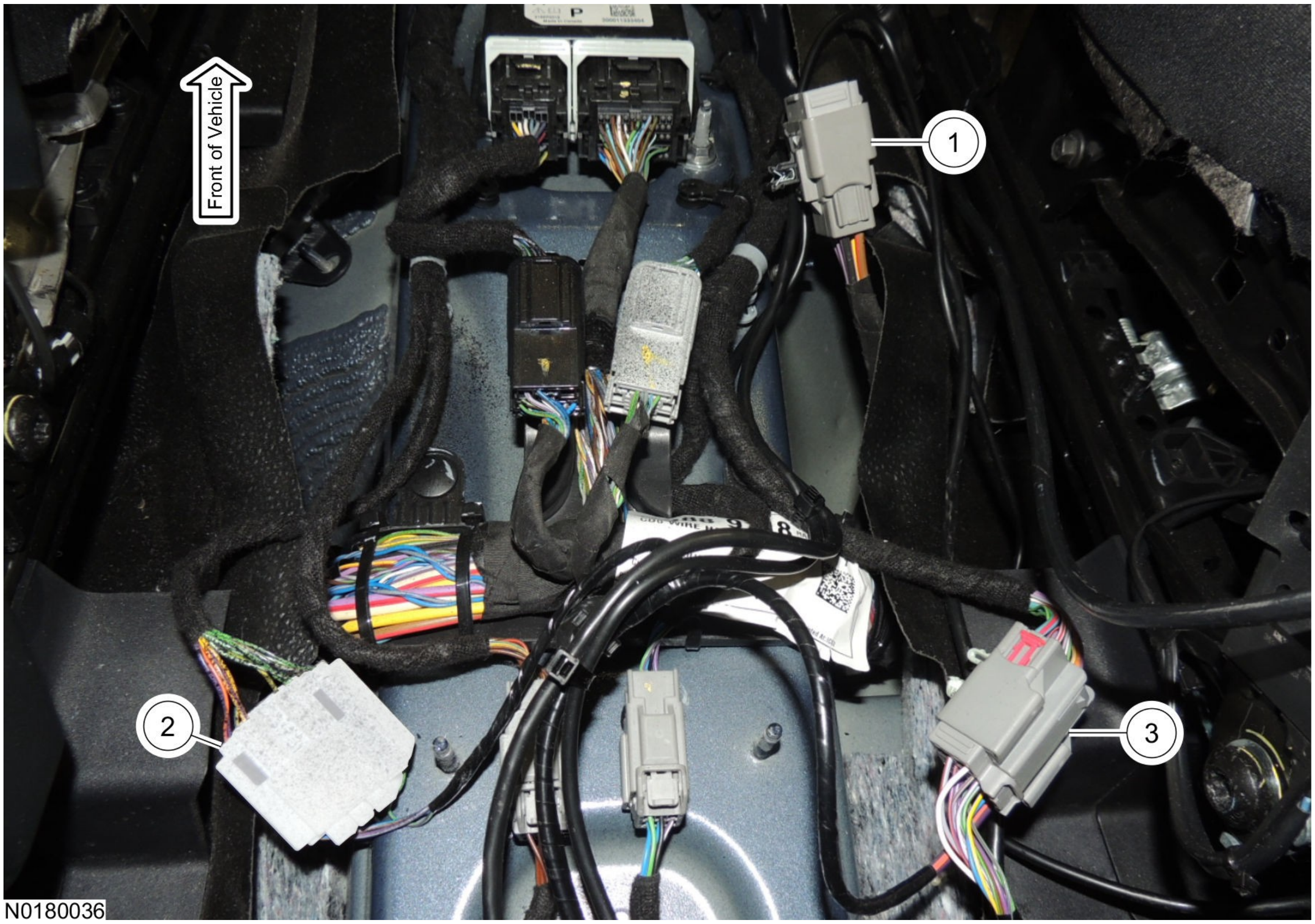
N0179997

2. Remove the 4 nuts and the center mounting plate.
   a. Torque: 93 lb.in (10.5 Nm)



N0180016

Section 3: General Electrical Information



1. Grey 6 pin connector.
2. White 14 pin connector.
3. Grey 14 pin connector.

Connector View For Grey 6 pin Connector

Pin Number	Description	Wire Color
1	B+ (40A)	BU-WH
2	B+ (40A)	YE
3	B+ (40A)	BN-RD
4	Ground	BK-WH
5	Ground	BK-WH
6	Ground	BK-WH

Section 3: General Electrical Information

Connector View For White 14 pin Connector

Pin Number	Description	Wire Color
1	Wig Wag Control	OG (Do **NOT** apply 12V to Pin 1 for Wig Wag control— See “Wig Wag Headlamps Control” wire diagram in section 5-30)
2		
3	B+ feed fused at 15 A max	YE-VT
4		
5		
6	Side LED Synch	GY-OG
7	Dimmer	VT-GY
8	Brake Output	YE-BU
9	Speaker + TDM Grill	BN
10		
11	Battery Saver	YE-GN
12	Horn - Module Side	GN-WH
13	Horn - Switch Side	GN-WH
14	Front LED Pattern	GN-VT

Connector View For Gray 14 pin Connector

Pin Number	Description	Wire Color
1	B+ Feed #1	WH-RD
2	Control Button 1	GY-BN
3	Control Button 2	WH-VT
4	Control Button 3	GN-BN
5	Control Button 4	YE-GY
6	Police Start	BU-BN (For voltage output see “Police Start” wire diagram in section 5-25)
7	RN/ST #1	VY-OG
8	B+ Feed #2	BU-RD
9	Vehicle Speed	VT-BN
10	Delay Accessory	VT-GY
11	B+ Feed #3	VT-RD
12	Park Detect	GN (See “Park Detect” wire diagram in seciton 5-25)
13	Diver Door Ajar	GN-VT
14	R/S #2	GY-BU

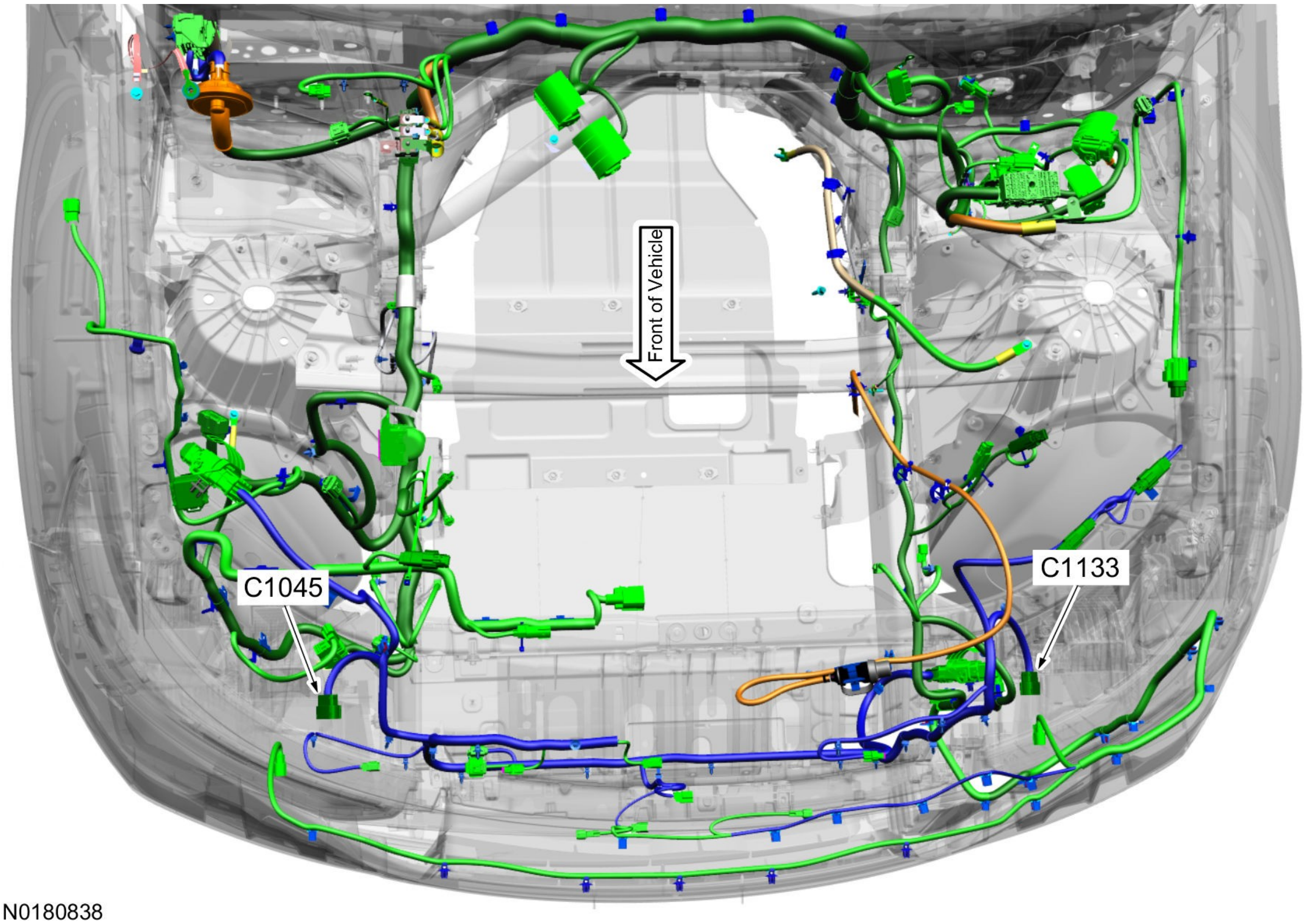
Wig Wag

1. 3 flash options are changeable by using FDRS.

Section 3: General Electrical Information

Headlight Led Color Change

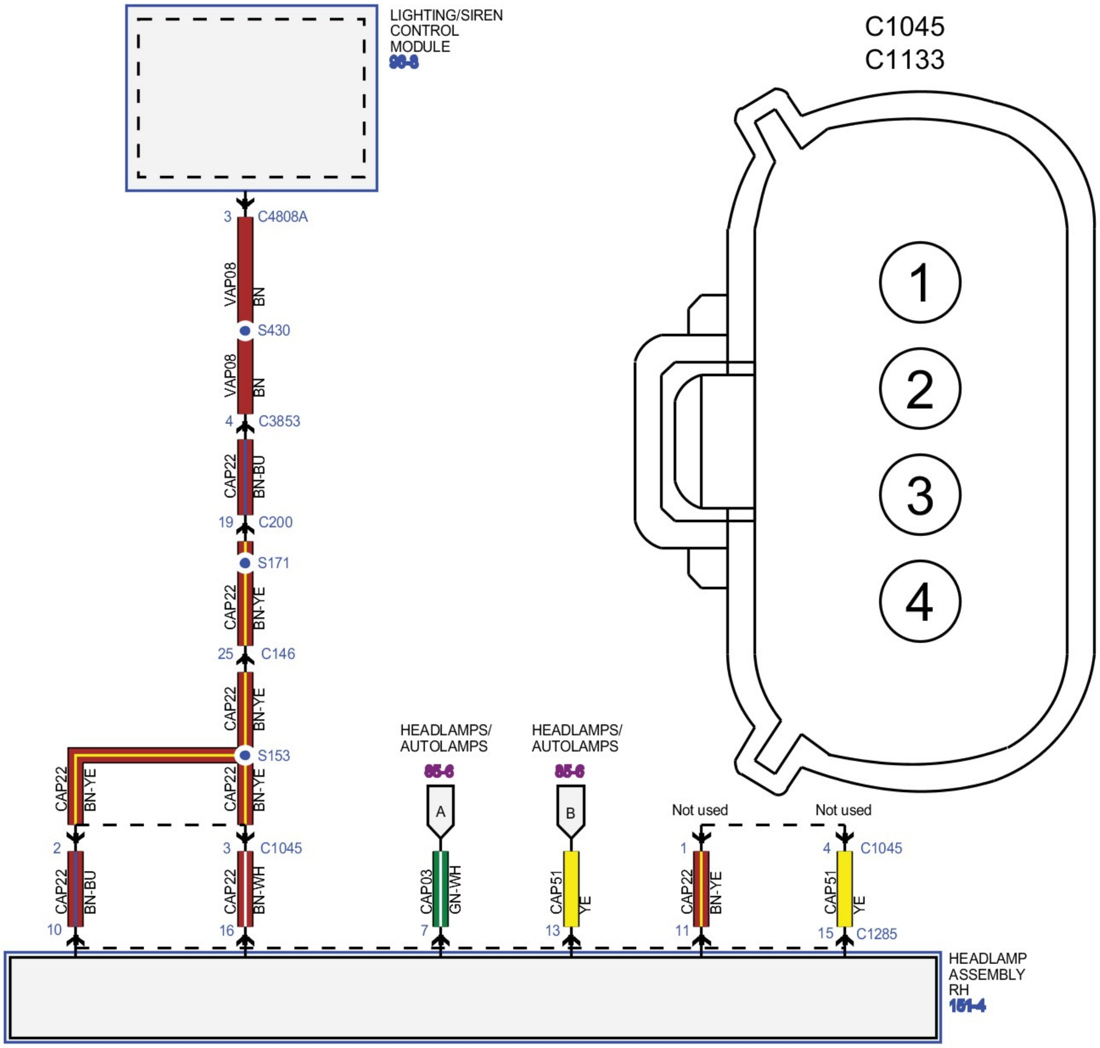
1. Vehicles equipped with the Headlight LED Option, the LED color is changeable by swapping the pin out in connector. Connector locations shown below.



N0180838

Section 3: General Electrical Information

RH diagram shown, LH identicle.


LIGHTING/SIREN
CONTROL
MODULE
90-8
C1045
C1133
1
2
3
4
3 C4808A
VAP08 BN
S430
VAP08 BN
4 C3853
CAP22 BN-BU
19 C200
S171
CAP22 BN-YE
25 C146
CAP22 BN-YE
S153
CAP22 BN-YE
CAP22 BN-YE
2
3 C1045
CAP22 BN-BU
CAP22 BN-WH
10
16
HEADLAMPS/
AUTOLAMPS
85-6
A
CAP03 GN-WH
7
HEADLAMPS/
AUTOLAMPS
85-6
B
CAP51 YE
13
Not used
1
CAP22 BN-YE
11
Not used
4 C1045
CAP51 YE
15 C1285
HEADLAMP
ASSEMBLY
RH
151-4

N0180839

Pin Number	Description	Wire Color
1	H/L, Run/Start, Headlamp LED 4” Flash Red/ Blue	BN/YE
2	Headlamp LED 4” Flash White	BN/GN
3	Headlamp LED 3” Flash Blue	BN/WH
4	Headlamp LED 3” Flash Red	BN/RD

2. The standard set up for the 4” headlamp LED is set to flash White. To change the 4” headlamp LED to flash Red/Blue, remove Pin 2 on the headlamp side of the circuit. Then move Pin 1 to Pin 2.
3. The Standard set up for the 3” headlamp LED is set to flash Red. To change the 3” headlamp LED to flash Blue, remove Pin 4 on the headlamp side of the circuit. Then move Pin 3 to Pin 4.

Table of Contents

Contents **PAGE**

Section 4: Vehicle Sealing and Vehicle Decommissioning 4-2
  Upfitter Sealing Pass-Through Points/Openings 4-2
  Sealing Pass-Through Points/Openings 4-2
  Liftgate 4-5
  Sealing Pass-Through Points/Openings 4-5
  Sealing Option For Body Openings/Pass-Through Points 4-5
  Dash Panel 4-6
  Decommissioning 4-7
  Disable Police Functions 4-8

Section 4: Vehicle Sealing and Vehicle Decommissioning

Section 4: Vehicle Sealing and Vehicle Decommissioning

Upfitter Sealing Pass-Through Points/Openings

Aftermarket upfit modification of hybrid interceptor utility vehicles can result in openings that allow external air and its contents to enter the vehicle that have not been sealed to original design intent.

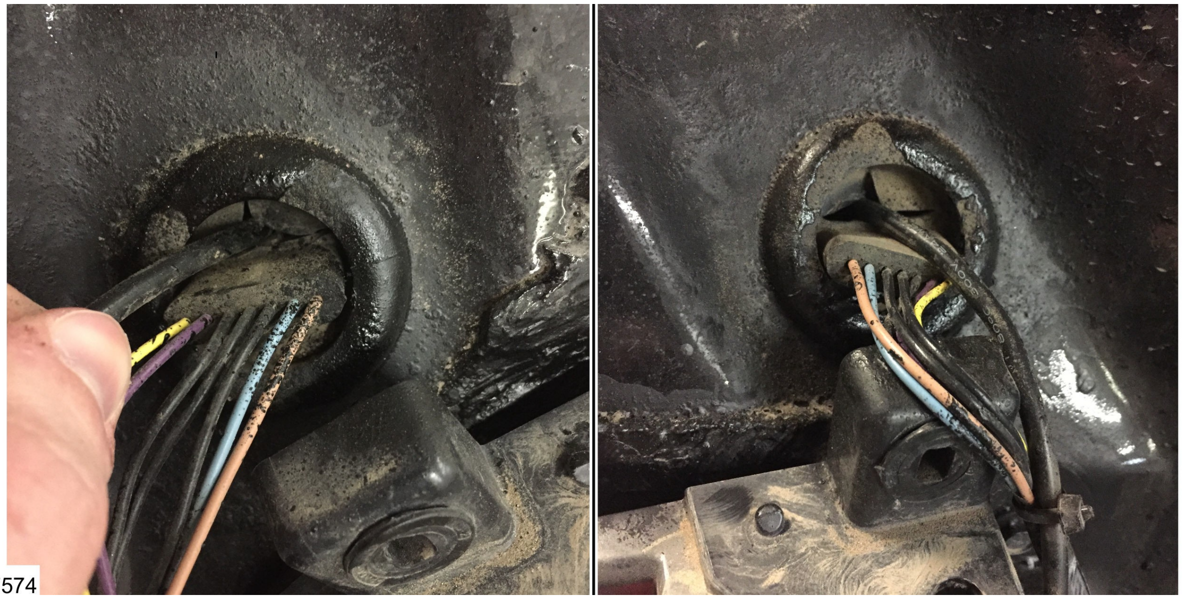
Examples of openings in some areas that were not properly sealed and allowed external air and its contents to enter the cargo area. Proper care and due to diligence must be used on all openings at any location on the vehicle from the dash panel to the rear of the vehicle.

Any and all holes created or existing grommets affected during upfit which are exposed directly or indirectly to outside air MUST be completely sealed using Motorcraft® Seam Sealer (TA-2-B).

Sealing Pass-Through Points/Openings

Some examples from a utility police interceptor that are not properly sealed are shown in the following:

- Any holes in the rear of the vehicle must be sealed.
- Wiring passing through sheet metal and/or existing grommets behind the passenger and driver side tail lamps must be fully sealed using Motorcraft® Seam Sealer (TA-2-B).



N0177574

Ballistic Panel Removal – special note:

The front door latch has been modified for doors with factory installed ballistic panels. Upon ballistic panel removal, a new front door latch and remote control assembly will be required.

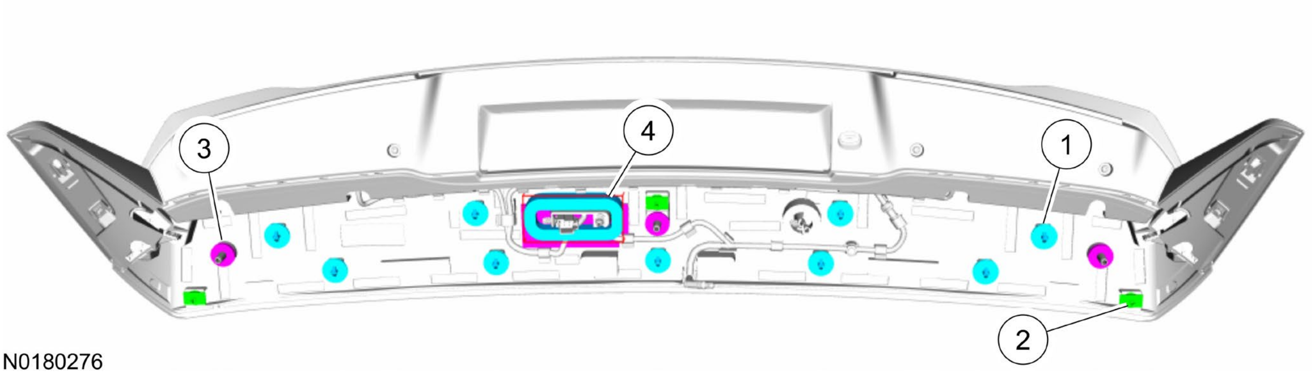
Section 4: Vehicle Sealing and Vehicle Decommissioning

Rear Spoiler Removal and Installation

NOTE:
Any time the rear spoiler is removed you MUST replace all retainers and gaskets.

1. Removal of the rear spoiler requires all the gaskets and retainers to be replaced to ensure a proper seal. Kit number LB5B–78442A86–AA will include the following.

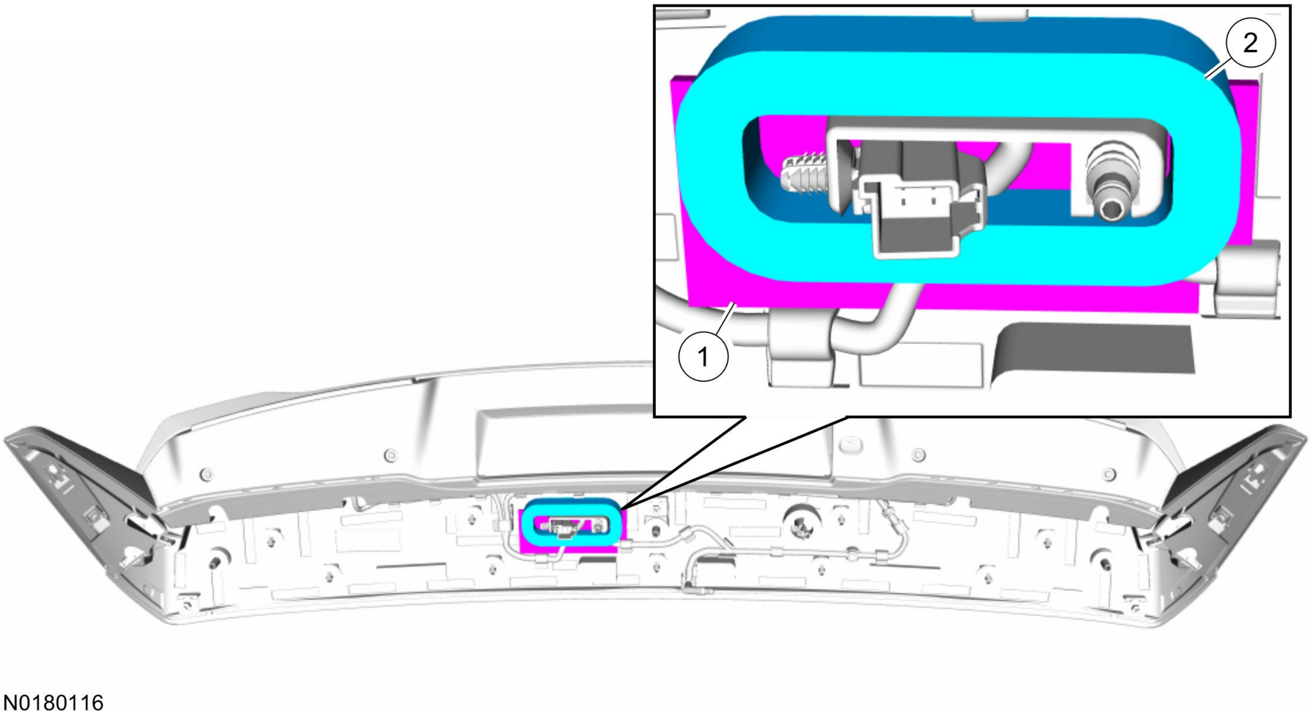
   - Item 1 — Nine w-clips with foam gaskets installed.
   - Item 2 — Three studs with foam gaskets installed.
   - Item 3 — Three indicator tab foam gaskets.
   - Item 4 — Two piece foam tower gaskets.



N0180276

2. Foam tower seal is made of two foam seals located near the center of the spoiler.

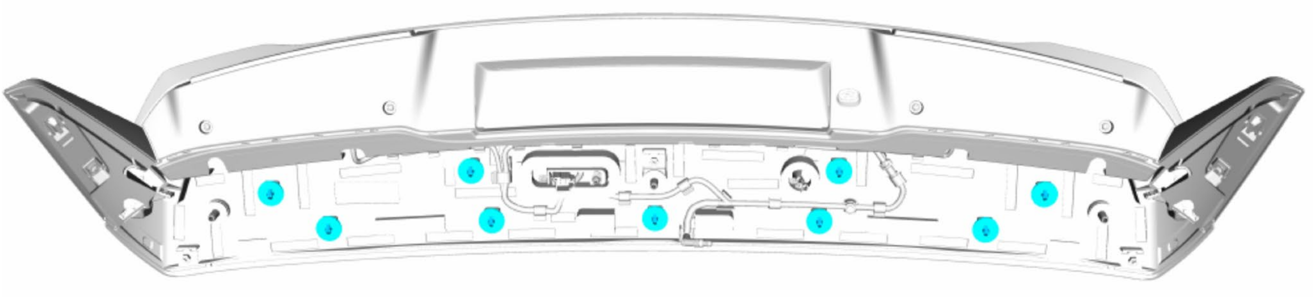
   - Item 1 — Flat gasket that is square in shape and is positioned under the washer lines.
   - Item 2 — Oval gasket that is positioned on top of the washer lines to complete the seal.



N0180116

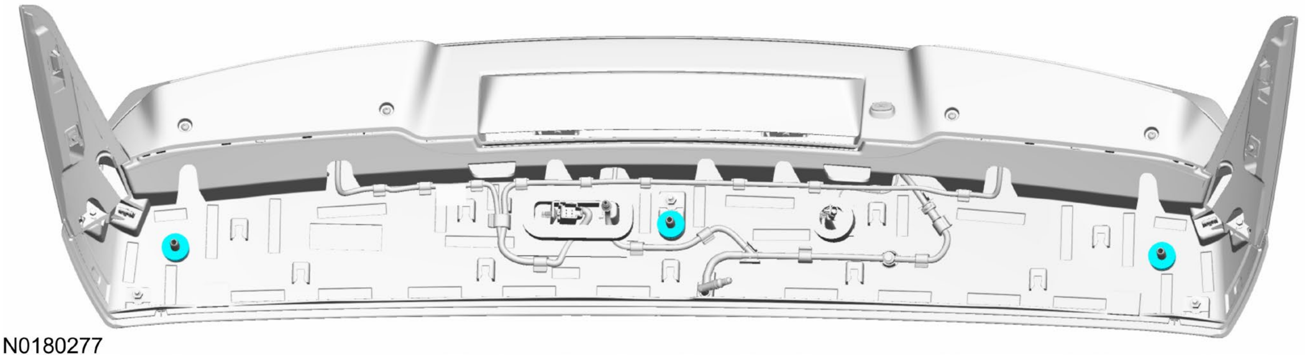
Section 4: Vehicle Sealing and Vehicle Decommissioning

3. W-clip retainer locations.



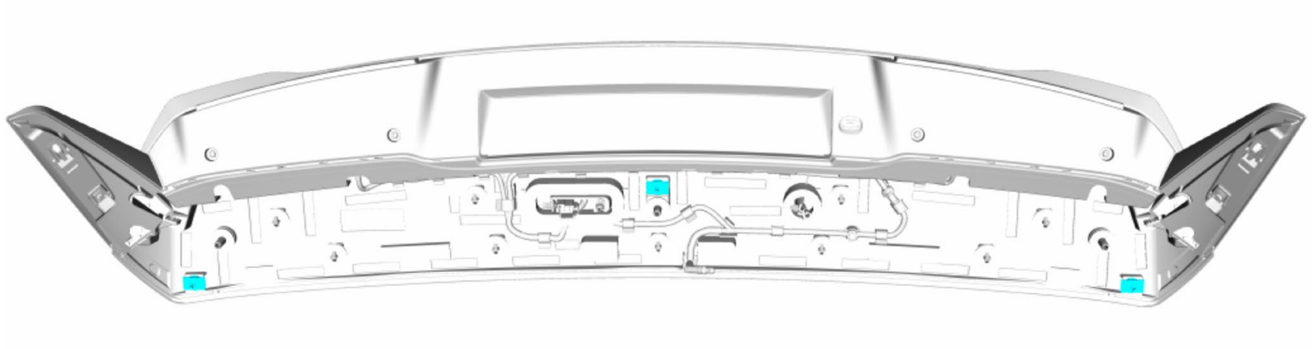
N0180117

4. Indicator tab foam gasket locations.



N0180277

5. Retainer stud with foam gasket locations.



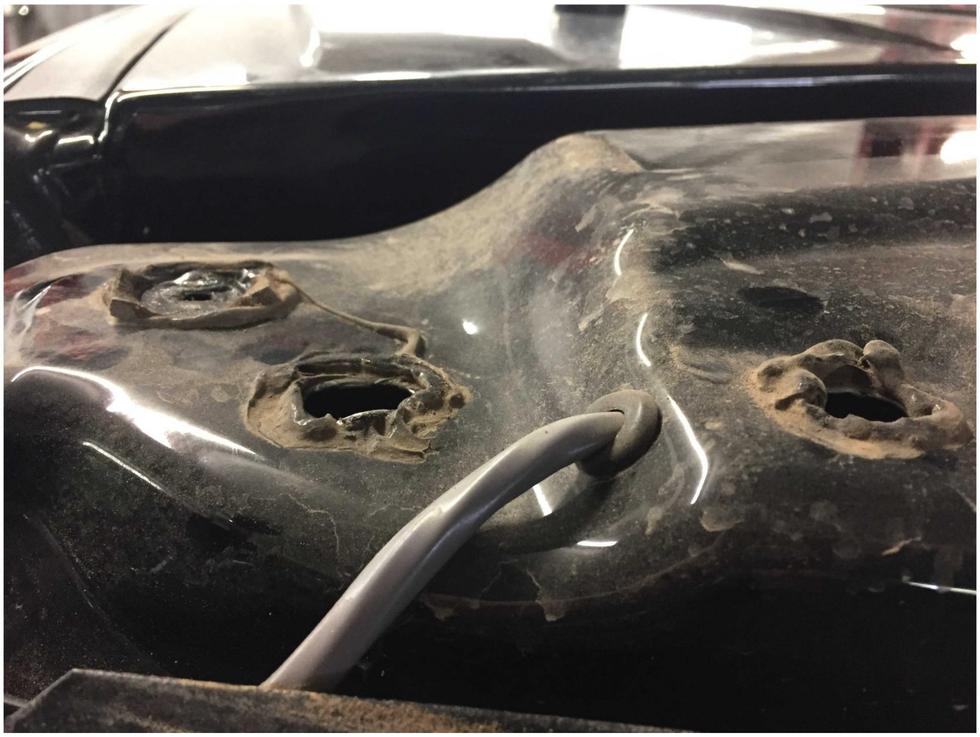
N0180278

Section 4: Vehicle Sealing and Vehicle Decommissioning

Liftgate

Seal any holes in the cargo area of the hybrid interceptor utility with Motorcraft® Seam Sealer (TA-2-B).

If the decklid seal is damaged it should be replaced.



N0179157

Sealing Pass-Through Points/Openings

Liftgate Bulb Seal

- If the light bulb seal is damaged, or removed for any reason, it should be replaced and properly seated and sealed.
- If the liftgate is damaged, or removed for any reason, it should be replaced and properly seated and sealed.

Underbody

- Seal any holes found in the body with Motorcraft® Seam Sealer (TA-2-B).
- Replace any damaged parts. The following are some examples:
- — Spare tire tub.
- — Auxiliary A/C pass-through.
- — Air extractors (replace if damaged).
- — Wiring grommets.
- — Body plugs.
- — Floor pan.

Dash Panel

Any seals and/or holes in the dash panel must be replaced and/or properly sealed using Motorcraft® Seam Sealer (TA-2-b).

Sealing Option For Body Openings/Pass-Through Points

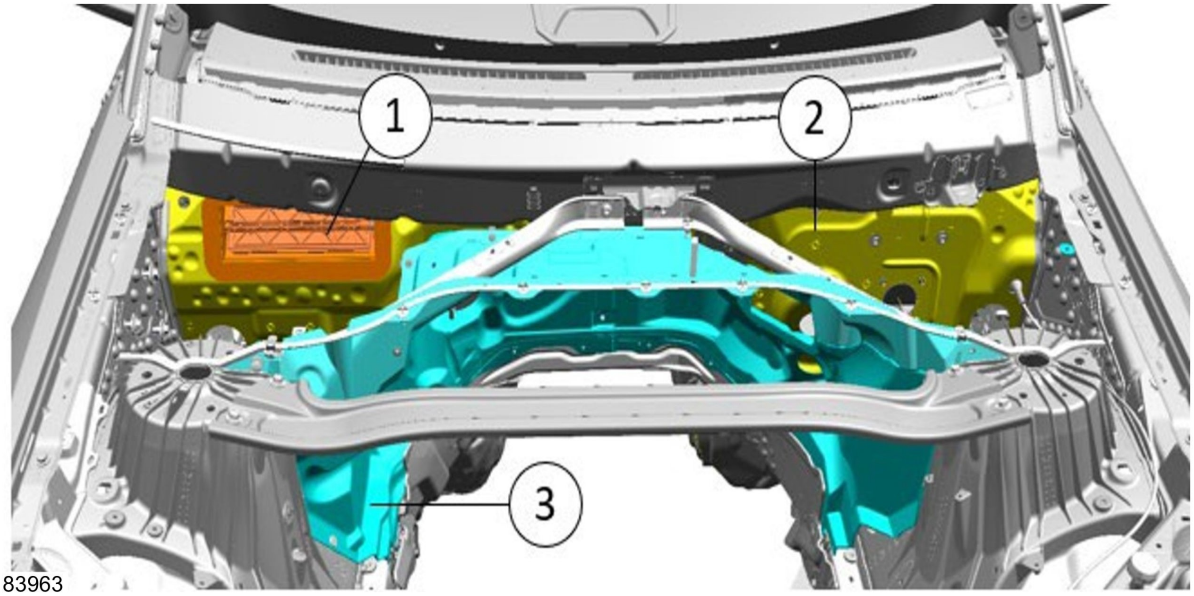
- Pass-through or other openings of similar size should be sealed using the recommended foil-backed mastic patch.
- Foil-backed mastic patch should be used to cover and seal body openings.
- Part number for foil-backed mastic patch:
- Following are service part numbers for two different size foil-backed mastic patches: 4L3Z18203A16AA; size of patch - 1.5 x 147 x 330 mm / DA5Z65203A16A; size of patch - 1.5 x 100 x 300 mm

Section 4: Vehicle Sealing and Vehicle Decommissioning

Dash Panel

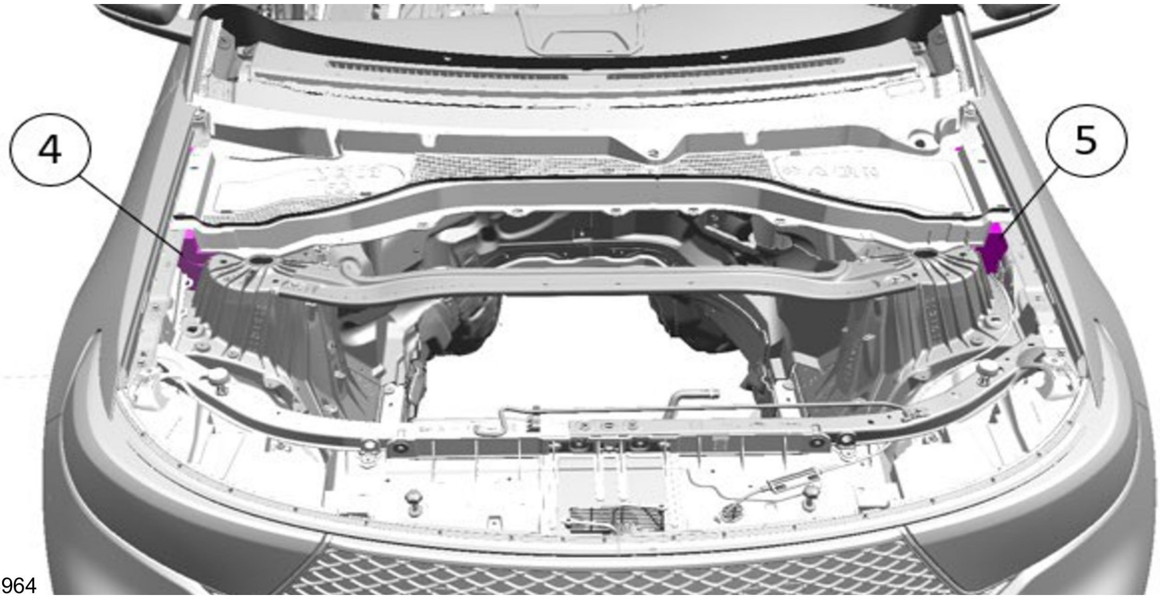
Any seals and/or holes in the dash panel must be replaced and/or properly sealed using Motorcraft® Seam Sealer(TA-2-b). The cavity between the inner dash panel and outer dash panel feeds the HVAC fresh air intake vent. Original sealing components for the dash panel cavity must be retained to avoid intake of engine bay air through the HVAC fresh airintake.

1. HVAC fresh air intake vent.
2. Dash inner panel.
3. Dash outer panel.



N0183963

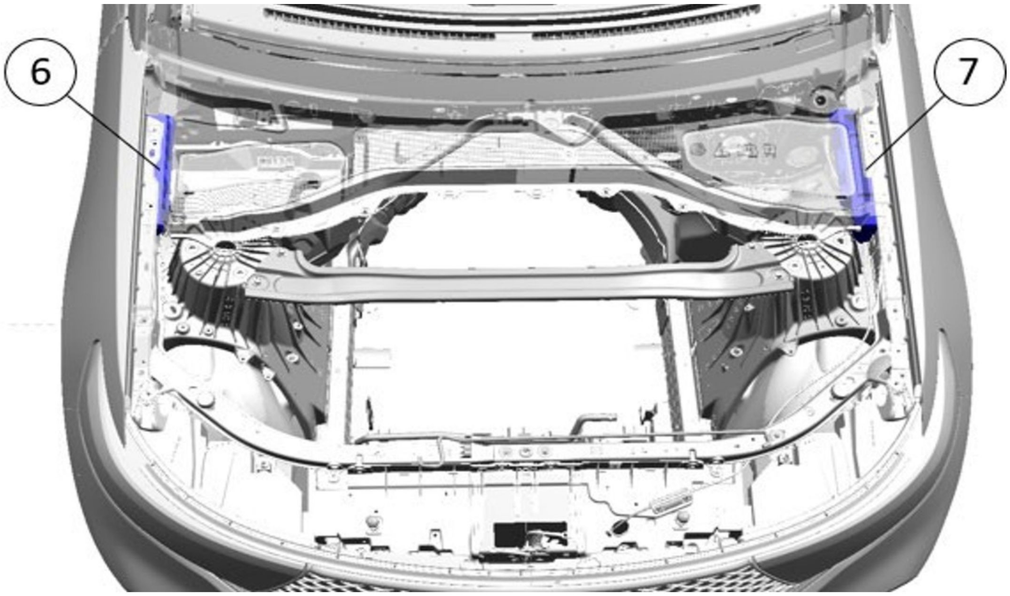
4. Passener side foam corner stuffer.
5. Driver side foam corner stuffer.



N0183964

Section 4: Vehicle Sealing and Vehicle Decommissioning

6. Passenger side foam fender stuffer (underneath leaf screen).
7. Driver side foam fender stuffer (underneath leaf screen).



N0183965

Decommissioning

Vehicle Sealing of Aftermarket Equipment

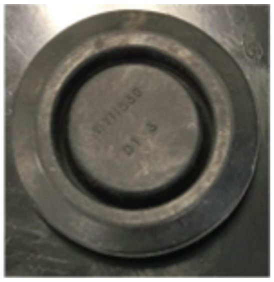
At the end of its useful life as a police vehicle, many vehicles are decommissioned by having the lights, wiring and other equipment removed. The vehicles are sold for other uses such as retail applications. The openings remaining in the body/components are potential leak paths for exhaust gas into the cabin under certain conditions. These openings must be sealed prior to the vehicle going to auction or any other application.

When customized equipment has been removed from the vehicle, body panels and seals may be compromised. Thoroughly inspect the vehicle for any signs where the equipment has been removed, such as holes and damage to body seals.

Any openings should be sealed with a plug and a sealant. The opening can be modified to enable a plug to seat properly promoting a better sealing surface. The sheet metal surface with the opening should be treated to prevent corrosion prior to inserting the plug and sealant.

Any items that remain on the vehicle must be inspected and any sign of damage repaired immediately. Failure to follow this instruction may result in water and exhaust fumes entering the passenger compartment.

See your authorized Ford dealer for more information and direction regarding proper sealing procedures.



N0178256

Common Ford Plug Part Number	Hole Diameter
W716284–S	0.859 inches / 21.83 mm
W714104–S	1.07 inches / 27.25 mm
W711539–S	1.378 / 35.0 mm
W651021–S	1.683 inches / 42.75 mm

Section 4: Vehicle Sealing and Vehicle Decommissioning

Tools For Creating A Circular Opening

Tools that can be used for creating and/or modifying an existing opening for a plug are a Knockout Punch or Step Bit.

13/16
7/8
1
1-1/8
1-7/32
1-1/4
1-3/8
3/8
7/16
1/2
9/16
5/8
11/16
3/4
13/16
7/8

N0178257

Disable Police Functions

- Procedures are under way to decommission the following Police Features:
- Police Idle
- Rear View Camera on Demand
- Perimeter Alert/Boundry Alert
- Procedures will be published in Police Bulletin P-030 when complete

Dark Car

Authorized personnel must use a diagnostic scan tool to decommission the Dark Car feature.

OBD-II Split Connector

Remove the OBD-II split connector cable prior to initial sale to the public sector.

Police Engine Idle

Authorized personnel must use a diagnostic scan tool to decommission the Police Engine Idle feature.

Police Perimeter Alert

Authorized personnel must use a diagnostic scan tool to decommission the Police Perimeter Alert feature.

Pre-Collision Assist Disable

Authorized personnel must use a diagnostic scan tool to decommission the Pre-Collision Assist Disable feature.

Rear Camera on Demand

Authorized personnel must use a diagnostic scan tool to decommission the Rear Camera on Demand feature.

Autonomous Emergency Brake (AEB)

Authorized personnel must use a diagnostic scan tool to decommission the Autonomous Emergency Brake feature.

Table of Contents

Contents **PAGE**

Section 5: Electrical 5-2
  Control Modules — Red Area 5-2
  Controller Area Network (CAN) Bus 5-2
  General Guidelines 5-2
  Equipment Grounding Guidelines 5-2
  Wire Insulation 5-2
  Terminals and Connectors 5-3
  Circuit Protection and Electrical Load 5-3
  Wire Protection Requirements 5-4
  Electrical Protection 5-4
  Mechanical/Environmental Protection 5-4
  Grommets and Sealing Requirements 5-4
  Wire Routing 5-5
  Wire Retention and Routing 5-6
  Splices and Repairs 5-7
  Replacing the Ford OEM antenna to an aftermarket antenna 5-12
  Replacing non-SYNC (CHR) radio antenna with an aftermarket antenna 5-12
  Police Interceptor Utility — Wiring Diagram Package Options 5-13
  Auxiliary Lamp LEDs (Stand-Alone Option) 5-13
  Front Lighting Package (Stand Alone Option) 5-14
  Tail Lamp LEDs (Stand-Alone Option) 5-15
  Liftgate Lighting Package (Stand-Alone Option) 5-16
  Gateway Connector (Option 61B) 5-17
  Side View Mirror LEDs (Stand-Alone Option) 5-19
  Rear Quarter Window LEDs 5-20
  Ultimate Wire Harness (Wiring and connectors ONLY) 5-21
  Ready-for-the-Road (Includes Lights and Driver Side Siren only) 5-22
  Lift Gate Applique LEDs (Stand-Alone Option) 5-22
  Spot Lamps (Stand-Alone Option) 5-24
  Park Detect & Police Start 5-25
  Driver Door Ajar 5-26
  Steering Wheel Switches Output 5-31
  Brake Output 5-32
  Base Vehicle — No Wiring Options 5-32
  Wig-Wag Headlamps Control 5-34
  Horn Ring Circuit 5-34
  Location of siren connector 1 5-36
  Location of siren connector 2 5-37
  Wire Diagram 5-37

Section 5: Electrical

Section 5: Electrical

Control Modules — Red Area

Do not install any components into the control modules or module harness. Connecting into this system may affect control module operation. For example, connecting aftermarket electrical equipment into the brake light circuit or any other circuit which is connected to the PCM, anti-lock brake computer, air bag system or any other vehicle system will cause vehicle malfunction.

Controller Area Network (CAN) Bus

NOTICE:
Wiring faults in the CAN bus may shut down the vehicle and prevent further operation.

Do not splice or connect any equipment to the CAN bus wiring.

General Guidelines

- Do not modify the cooling system. High voltage vehicle components may be damaged if any cooling system modifications are attempted.
- Do not backprobe, splice or repair the high voltage system (orange) wiring/cables.
- Do not mount to or modify the high voltage system (orange) wiring/cables in any way.
- Do not cut, weld or screw into the HVTB case or penetrate the batteries in any way.
- Air bag restraint systems must remain intact as received from Ford Motor Company. Before modifications are done to the vehicle, the system must be depowered by following the instructions provided in the current Workshop Manual.
- Provide circuit protection (fuses) for all wiring. The fuse rating should not exceed either the rated wiring current capacity or the total current requirements for all the add-on components on the circuit. Install fuses as close to the point of tapped power as possible.
- Provide protective covering in all areas that could be damaged during normal equipment installations.
- Do not allow control panels attached to the instrument panel to protrude into the driver and passenger air bag deployment zones. For additional information, refer to Section 4: Reference in this guide.
- Do not install switches and gauges in the driver or passenger knee impact areas.
- Provide adequate retention for wiring harnesses so they are clear of bolts, corners or edges which could abrade the wires during normal vehicle operation.
- Properly secure all wiring relocated or removed while working behind the instrument panel to prevent chafing, squeaks and rattles.
- Anticipate misrouted wiring situations and protect all wiring from penetration by screws and raw edges.
- Weather-seal all electrical connectors exposed to the elements.
- Do not use quick splice connectors or wire nuts.
- Install the fuse panel so fuses are readily accessible.
- Make sure that connections are easily accessible for assembly and service.
- Inspect all Ford gauges, lights and switches for correct operation after instrument panel work is performed.
- Make sure submersible connectors do not lose their seals under extreme assembly conditions such as bending wires 90 degrees immediately after the connector.
- Whenever using connectors, use a socket (female) connector on the electrical source side and a plug (male) connector on the electrical load side to reduce the possibility of a short circuit when disconnected.
- Adherence to the above guidelines is not to be construed as approval by Ford Motor Company of any specific revisions or additions to the vehicles original electrical system.
- Document all revisions to the electrical system and place with the vehicle Owner's Literature. Color code and/or label all revisions or additions to wiring.
- Disconnect the negative battery cable of vehicles stored on-site to reduce the possibility of draining the battery by lights or other equipment.

Equipment Grounding Guidelines

- Do not ground the body to the transmission or transmission crossmember. Ground accessories to the chassis or the vehicle battery.
- Splicing into circuitry relating to the electronic engine and/or transmission control systems is not acceptable because of the adverse effect on the electronic system operation.
- Adequately protect electrical connections exposed to the elements.

Wire Insulation

- Polyvinyl chloride (PVC) rated at 90°C (194°F) is the standard wire insulation acceptable for inside body use but is not acceptable for underhood/underbody wiring.

Section 5: Electrical

- Hypalon insulation should be used on links only (Ford specification ESB-M1L54-A).
- Cross-linked polyethylene (XPLPE or SXL) rated at 125°C (257°F) is the required insulation for underhood/underbody applications (Ford specification ESB-M1L123-A).
- GXL can be used as an alternate wire (Ford specification ESB-M7L85B) as long as the concentricity specifications are met. To provide a water-resistant seal in conjunction with crimp connectors, a Duraseal® crimp connector is recommended since it is designed to account for outside wire diameter that is smaller than the present SXL wire.

Terminals and Connectors

Connector Types:

- Submersible (sealed) — A connector that is capable of being immersed in water.
- Weather-resistant — A connector that will retain its sealing and connection qualities while being exposed to adverse weather conditions.
- Duraseal® crimp — A supplier trade name for a sealed wiring repair or splice.

When a connection is not defined (typical situation — harness-to-harness connectors), the following suggestions should be implemented:

- Determine the connector type. If the vehicle will be located in an area exposed to water, salt accumulation and/or high temperatures (such as underhood, exterior panels and footwells), use a sealed connector. Use in-line connectors with secondary locks to prevent the terminal from being pushed out.
  - Do not use single wires smaller than 14 gauge in a 2-way or larger weather-resistant connector (the very large style), since the wire may break during disengagement.
  - Use Hypalon, XLPE or Elexar insulation in submersible connectors to maintain sealing integrity. PVC is not acceptable because its properties allow it to set in a deformed pattern, therefore compromising the integrity of the seal.

- Determine the terminal type. Base your decision on wire gauge, current carrying capacity, connector type and insulation type.
  - Use non-detent low insertion force terminals whenever possible.
  - Do not use low insertion force female terminals in weather-resistant connectors.
  - Analyze circuit requirements (signal levels, current, voltage) to determine the proper plating material (such as gold). Use of non-plated terminals is not recommended.
  - Do not use plugs to seal holes in micropin connector grommets. It is very easy to forget to insert them during manufacturing and ruin the seal. Use a grommet with only the necessary number of holes or use dummy wires at least 600 mm (24 in) long.
  - Fully align connectors prior to terminal connection — terminal cavities should have minimum tolerance to prevent terminals from floating, bending or pin push-out during mating/engagement.
  - Make sure connectors of similar type and color are identifiable to the operator to eliminate crossed connections and minimize assembly time. Avoid using similar types and colors of connectors close together.
  - Be sure that connectors have positive locking devices that allow easy installation with a low insertion force and easy removal. The connector snap should be easily felt and heard.
  - Eliminate the use of edgeboard, tang-type and molded-over connectors. The use of blade-type weather-resistant connectors is restricted to high-current applications which cannot be handled by submersible connectors.

Circuit Protection and Electrical Load

- Modification to the vehicle’s existing low voltage (12 volts) wiring should be done only with caution and careful consideration of effects on the completed vehicle’s electrical system. Anticipated circuitry should be studied to determine the required circuit protection and to avoid feedback loops.
- Added circuitry must be protected either by a base vehicle fuse or circuit breaker, or by a similar device supplied by the modifier.
- When adding loads to a base vehicle-protected circuit, make sure the total electrical load through the base vehicle fuse or circuit breaker is less than the devices load rating.
- Use 80% of the fuse rating to determine maximum steady state load to reduce nuisance fuse failures.
- Use 135% of the fuse rating when sizing wiring to protect the circuit in the event of an overload. Fuses will last for one hour at 135% of their rating.
  - Total current draw is the sum of the base vehicles circuit current requirement (measured with an ammeter) and the anticipated add-on component current requirements.
  - Never increase the rating of a factory installed fuse or circuit breaker.
  - If the total electrical load including additional electrical components, on any circuit, is less than the fuse protection rating or the capacity of some limiting component (switch, relay), the items to be added can be connected directly to that circuit. The headlamp switch circuits should never have additional lighting or electrical components directly connected.
  - Added devices that exceed the current capabilities of the factory-installed system are best controlled through the use of a relay or separate switch. The coil of the relay can be fed from the circuit in the factory harness (now acting as a signal circuit) with added wiring providing feeds to the added electrical device. The relay selection is important and depends on current requirements, number of cycles expected in the relay lifetime, whether the relay is to be operated intermittently or for long periods of time and whether the relay is exposed to weather conditions or is installed in a protected area. When the current requirements of a circuit exceed the capacity of an available relay, the load should be reduced or divided through the use of additional relays.

Section 5: Electrical

Wire Protection Requirements

General Notes

- Anticipate problems and design accordingly. Try to anticipate what could go wrong and modify your designs to address any adverse impact.
- Review all connector applications and electrical systems to determine the need for solder, grease, weather-resistant or sealed connectors. Make sure components and wire insulation are compatible with greased connectors (important for long-term durability).
- Make sure that drip loops or other means are provided to prevent water leakage into the vehicle through wiring assemblies that pass through the dash panel.
- Use greased or sealed connectors in floor pan troughs which are subject to moisture coming through the carpeting.
- Use XLPE insulation for uncovered runs that exceed 305 mm (12 in).

Electrical Protection

- Properly route wires away from noise-generating wires or components. However, if routing near noisy wires or plugging into noisy components is unavoidable, design additional protection into the harness.
- Electromagnetic interference (EMI) shielding — Consider shielding if you must route close to high-current or noisy circuits. Use shielded wire and ground one side. Seal all splices in wire assemblies that use bare coaxial shielding (braid or tape) for EMI suppression, and insulate or tape over all shielding ends that terminate near any open connectors. This prevents splice and terminal shorts to the shielding. Minimize the length of conductors which extend beyond the shield. Failure to do this reduces the effectiveness of the shield.
- Spike suppression, in general, is accomplished by connecting a diode or resistor-diode combination across the terminals of the noisy component. The diode should be sufficiently close to the component (both electrically and physically) so that inductive spikes are clamped off. Make sure the diode is connected with the proper polarity.

Proper routing and retention reduces the likelihood of chafing or pinching. When this ideal routing is unattainable, the following additional protection is needed:

Mechanical/Environmental Protection

NOTE:
This is not meant to be an all-inclusive list of methods for physically protecting the wires. There are other means of protection available that are not listed.

- Tape — Tape is the most basic means of protection. It contains the wires in a loose bundle and provides limited environmental protection. It does not protect against chafing and pinching.
  - Kendall polyken fiberglass base tape (Ford specification ESB-M3G38-A) is used for engine compartment applications. This durable tape provides protection against cut-through and abrasion commonly found in underhood applications.
  - Polyken 267 is a substitute tape that may be used in lower temperature areas of the engine compartment (apron area).
- Convolute — Use convolute for all underhood/underbody applications or when increased temperature, abrasion or pinch resistance is required. Convoluted tubing comes in different diameters and materials to accommodate different temperature ranges and harness sizes.
  - Use polyethylene convolute when abrasion is the only consideration; this convolute is adequate up to 96°C (205°F) maximum. Use nylon convolute when underhood/underbody or abrasion and temperature are considerations; nylon convolute is adequate up to 177°C (350°F) maximum.
  - On all engine-mounted wiring or bend points, use vinyl tape on the outside of the convolute to prevent wiring from looping out. This tape must be able to withstand temperatures 135°C (275°F) or higher.
  - Tape convolute junctions with abrasion-resistant tape (Polyken 267, fiberglass).
- Scroll — Similar to convolute, but without the ridges. Scroll is used where harness rigidity is required, especially for maintaining critical locator dimensions. Use scroll for short lengths only, as it is inflexible.

Grommets and Sealing Requirements

Any additional wiring routed through sheet metal must pass through a grommet that both seals the opening and locates the wire(s). Two-piece grommets (rubber with plastic inserts) are recommended to facilitate installation and retention.

- Locate grommets so they are accessible for proper seating (achieved by pulling) in sheet metal holes.
- Ramp grommets at the insertion end to facilitate installation and sealing.
- Be sure the direction of the hole punch is in the direction of grommet seating and the hole is burr-free.
- Make sure the grommet molding compound adheres to the harness to prevent slippage.
- Make sure the grommet will withstand the environment (temperature, wet conditions).
- Be sure the holes are large enough to allow the installation of the harness without causing circuit damage.
- Use adhesive tape on main trunks or branches with at least a 50% overlap to prevent wicking through grommets. Be certain to diaper-wrap the takeouts.

Section 5: Electrical

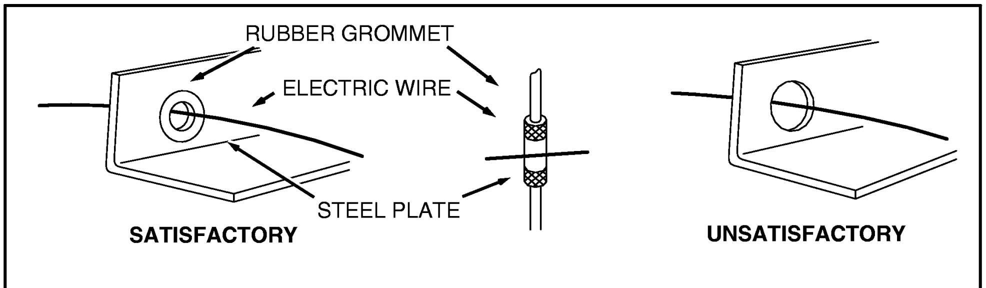
Wire Routing

⚠ **WARNING:**

Do not place electrical component attachments or ground screws adjacent to vehicle fuel tanks, fuel filler pipes, fuel lines, fuel vapor lines or carbon canisters. Failure to follow these instructions may result in severe personal injury in the event of a collision.

Wire harness routing should conform to the following:

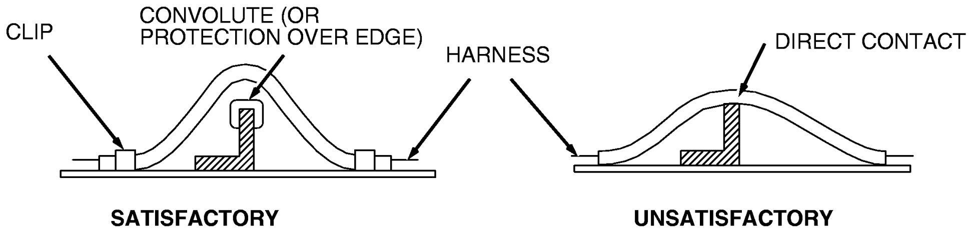
- Protect wires routed through holes in sheet metal or castings with a grommet whether or not conduit is used (see figure below).



• **Cables should not be in contact with sharp edges or pierced holes.**

A0073515

- Route wires to avoid metal edges, screws, trim fasteners and abrasive surfaces. When such routing is not possible, use protective devices (shields, caps) to protect the wires. Cover metal edges with a protective shield and fasten the wiring within 76 mm (3 in) on each side of the edge (see figure below).



A0073514

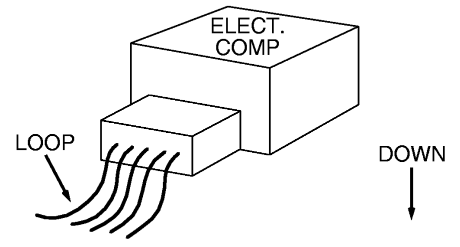
- Route wires to provide at least 76 mm (3 in) of clearance to moving parts in their extreme movement location, unless positively fastened and protected by conduit.
- Avoid wire routing without conduit in areas where temperatures exceed 82°C (180°F). Heat insulation and heat shields must be used on the wires routed in high-temperature areas.
- Make certain that all underhood or underbody wiring is cross-linked polyethylene high-temperature insulation wire 135°C (275°F) (minimum rating) consistent with SAE specification J1128 Type SXL wire. Normal PVC wire must not be used in underhood or underbody applications.
- Make sure all ground locations are readily accessible for installation, service and verification.
- Do not place ground attachments in high splash areas.
- Underhood/underbody wiring must be routed in conduit for protection. Minimum conduit rating is 177°C (350°F).

Section 5: Electrical

Wire Retention and Routing

Use the following criteria to determine the location of retainers:

- Size and weight of wire bundle.
- Holes with poor accessibility that prevent installation of locators.
- Movement of wires that can result in abrasion, squeaks and rattles.
- When wiring is routed between 2 members where relative motion can occur, the wiring should be secured to each member with enough wire slack to allow flexing without damaging the wire.
- Wiring exposed to weather must provide a drip loop to prevent moisture from being conducted into the device through the wire connection (see figure below).

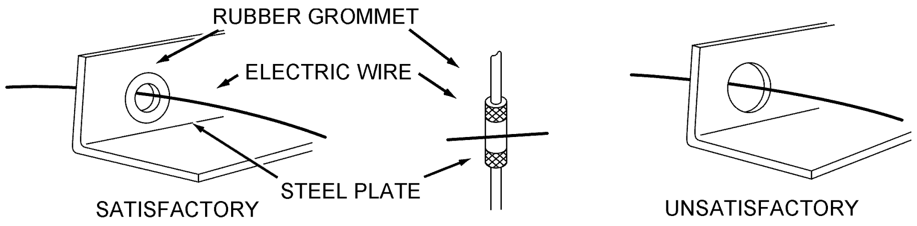


• Drip loops should be provided at connectors and grommets to direct water away from terminals or inside the vehicle.

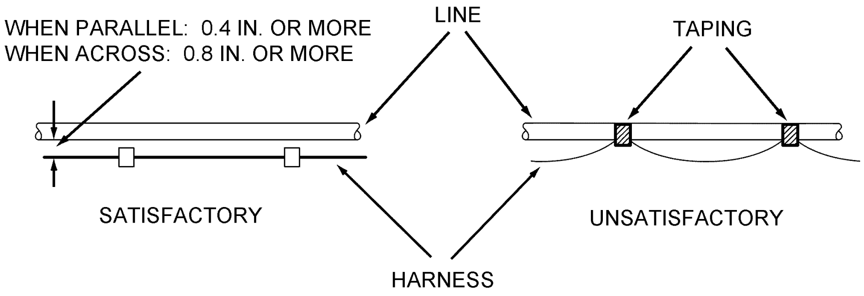
A0073517

- Avoid routing wires into areas exposed to wheel splash. When such routing cannot be avoided, adequate clipping and/or protective shields are required to protect the wires from stone and ice damage. Allow adequate slack in wiring between the engine and stationary components to compensate for engine roll.
- Avoid routing wires under the frame side members or at points lower than the bottom frame flange.
- Use plastic zip straps for bundling only (securing to other wires).
- The wire retainers and grommets installed by the assembly plant are usually designed to accommodate only the Ford-installed wires. Additional wiring or tubing should be retained by additional clips. When added wires or tubes are routed through sheet metal panels, use new holes with proper wire protection and sealing.

Section 5: Electrical


RUBBER GROMMET
ELECTRIC WIRE
STEEL PLATE
SATISFACTORY
UNSATISFACTORY

• Cables should not be in contact with sharp edges or pierced holes.


WHEN PARALLEL: 0.4 IN. OR MORE
WHEN ACROSS: 0.8 IN. OR MORE
LINE
TAPING
SATISFACTORY
UNSATISFACTORY
HARNESS

• Harnesses should not be taped to fuel lines or other lines. A sufficient clearance should be maintained between harness and lines.

N0070449

For retainer screws, the following guidelines apply:

- Avoid using fasteners that are too long for the application or are in an area which might damage vehicle components, including wiring, brake lines, fuel tank and lines, powertrain components, exhaust system and suspension.
- Do not use pointed screws for attachments. Make sure that screws used in the vicinity of the wiring are blunt-ended.
- To minimize the potential for wiring shorts, do not use drill point screws. Trim components (including wiring shields) should use pin-type attachments instead of screws.
- Always check areas that screws protrude into for verification that an interference condition to other components does not exist.
- Make sure that retainers used are capable of withstanding the environment over the vehicle's life expectancy.

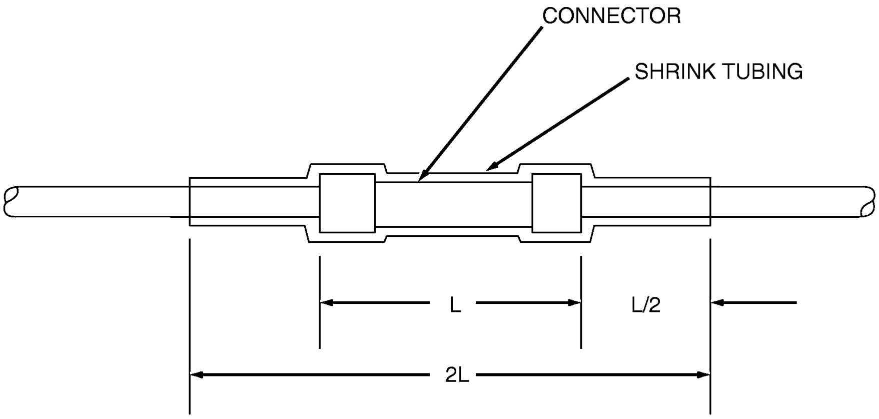
Section 5: Electrical

Splices and Repairs

⚠ **WARNING:**

Do NOT splice into or repair high voltage (orange) wiring/cables. The high voltage in this system is approximately 300 volts DC. Failure to follow these instructions may result in severe personal injury or death.

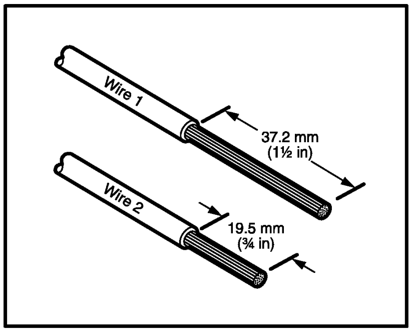
- Stagger the splices within a harness to reduce increased harness diameter. Splice only on straight areas as installed, not on bends.
- Strip wire ends, making sure that individual conductor strands are not damaged.
- When soldering, make sure an adequate mechanical joint exists before applying solder. Use only resin-core solder. Acid-core solder should not be used since it may result in corrosion.
- For crimp joints, use butt-type metal barrel fasteners and the proper tool at the appropriate setting for the wire size (such as Motorcraft® Crimp Tool S-9796) specifically designed for this type of work.
- Make sure splice joints are adequately sealed and insulated. In an outside environment, use Duraseal® butt connectors or equivalent. A durable substitute splice joint can be achieved by using a bare metal barrel, crimping, flow-soldering and covering with shrink tubing. Quality electrical tape can be used inside the vehicle but is not recommended for an outside environment.
- Make sure the new wire is not a lesser gauge than its original mating wire.



A0074039

Recommended Splicing Method — Solder (For 16 AWG and Smaller Diameter Wire Only)

1. Disconnect the battery ground cable.
2. Strip wires to appropriate length.

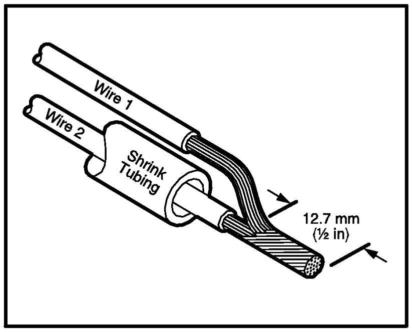


A0075761

3. Install heat shrink tubing.
4. Twist the wires together.
5. **NOTE:**
   Use resin-core mildly-activated (RMA) solder. Do not use acid-core solder.

   Solder wires together.

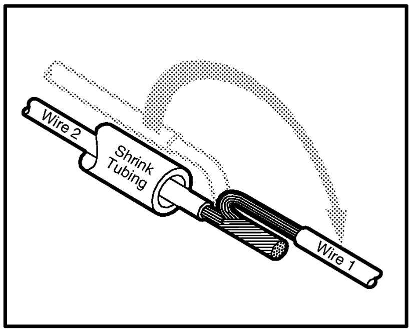
Section 5: Electrical


Wire 1
Wire 2
Shrink Tubing
12.7 mm
(½ in)

A0075762

6. **NOTE:**
   Wait for solder to cool before moving wires.

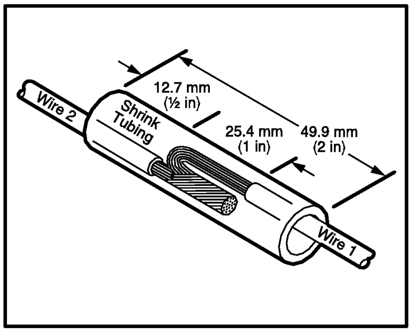
   Bend wire No. 1 back in a straight line.


Wire 2
Shrink Tubing
Wire 1

A0075763

7. **NOTE:**
   Overlap tubing on both wires.

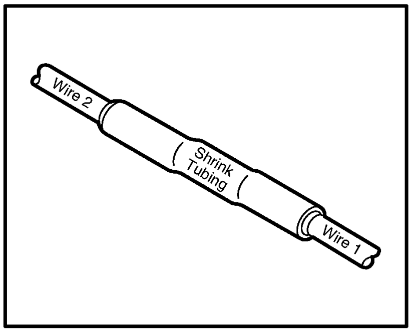
   Evenly position heat shrink tubing over wire repair.


Wire 2
Shrink Tubing
12.7 mm
(½ in)
25.4 mm
(1 in)
49.9 mm
(2 in)
Wire 1

A0075764

8. Use a shielded heat gun to heat the repaired area until adhesive flows out of both ends of heat shrink tubing.

Section 5: Electrical



A0075765

9. Reconnect the battery ground cable.

Sealed Connectors

Ford Part Number	Part Name	Class
E6FZ-14488-A	Butt Connector Gauge: 18-22, Color: Red	C
E6FZ-14488-B	Butt Connector Gauge: 14-16, Color: Blue	C
E6FZ-14488-C	Butt Connector Gauge: 10-12, Color: Yellow	C

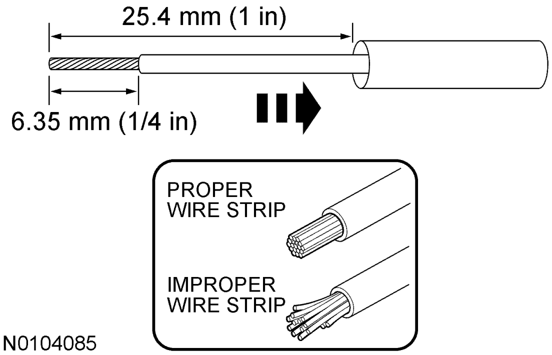
Heat Shrinkable Tubing (Heat Shrink) (Ford Specification ESB-M99D56-A2)

Heat shrinkable tubing is available in various diameters for different splice sizes and configurations. When shrunk, it forms a small, flexible hermetic seal.

Other methods (tape, PVC mold) do not provide a hermetic seal and are not recommended. Splice balancing is critical with heat shrink insulation. If the splice is extremely unbalanced (more circuits on one side than the other), heat shrink insulation will not provide a proper seal. Evaluate the use of double terminals instead of splices where practical in these situations.

Recommended Splicing Method — Crimp (For 10 - 22 AWG Diameter Wire to Like Wire Diameter)

1. Disconnect the battery ground cable.
2. Strip wires to appropriate length.
3. Install heat shrink tubing.



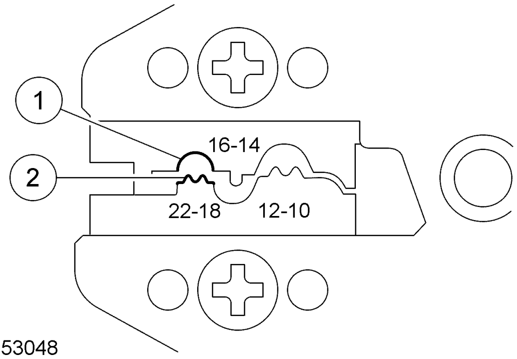
N0104085

4. Select the appropriate wire splice for the wires to be spliced from Rotunda Wire Splice Kit 164-R5903.

Section 5: Electrical

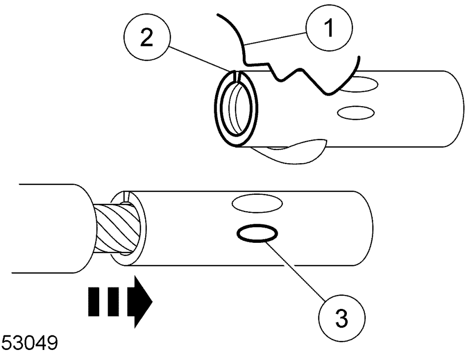
5. **NOTE:**
Rotunda Pro-Crimper 164-R5901 supplied with the wire splice kit is the only tool that can be used with these splices.

   Identify the appropriate chamber on the Rotunda Pro-Crimper by matching the wire size on the dies with the wire size stamped on the butt splice.
   (1) Cavity
   (2) Indenter



N0053048

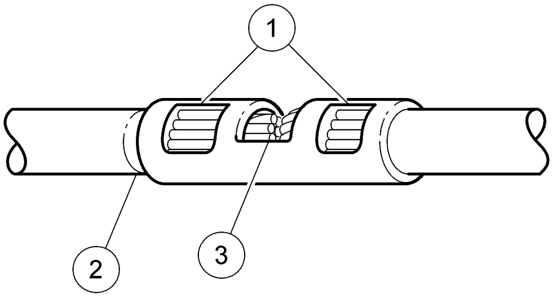
6. Crimp the connector.
   (1) Center one end of the wire splice in the appropriate crimping chamber.
   (2) Insert stripped wire into the barrel.
   (3) Holding the wire in place, squeeze the tool handles until the ratchet releases.



N0053049

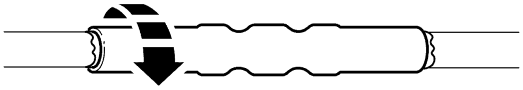
7. Repeating Step 6, crimp the other half of the splice.
8. Check for acceptable crimp.
   (1) Crimp should be centered on each end of the butt splice.
   (2) Wire insulation does not enter butt splice.
   (3) Wire is visible through inspection hole of splices.

Section 5: Electrical



N0053050

9. Evenly position supplied heat shrink tubing over wire repair.
10. Use a shielded heat gun to heat the repaired area until adhesive flows out of both ends for the heat shrink tubing.



N0070450

11. Reconnect the battery ground cable.

Replacing the Ford OEM antenna to an aftermarket antenna

NOTE:
With SYNC based radio – it is NOT possible to adjust the date on the SYNC unit with the control panel.

To be able to change the date on the SYNC unit, use following process

- Park the vehicle in an open area to get a GPS signal and provide the correct date
- Leave the key in “ON” position
- Disconnect the OEM antenna
- Replace the antenna with aftermarket antenna

NOTE:
However every time the battery gets disconnected (or drops below 9V) the date will revert back to 01-01-2000 so they would have to reconnect the OEM antenna each time the battery cable is reconnected to allow the Date to update via GPS signal. Not a very robust work-around but there is no alternative other than leaving the date incorrect.

Replacing non-SYNC (CHR) radio antenna with an aftermarket antenna

Procedure for updating the displayed date

- RADIO can be ON or OFF
- Settings
- Clock settings
- Date

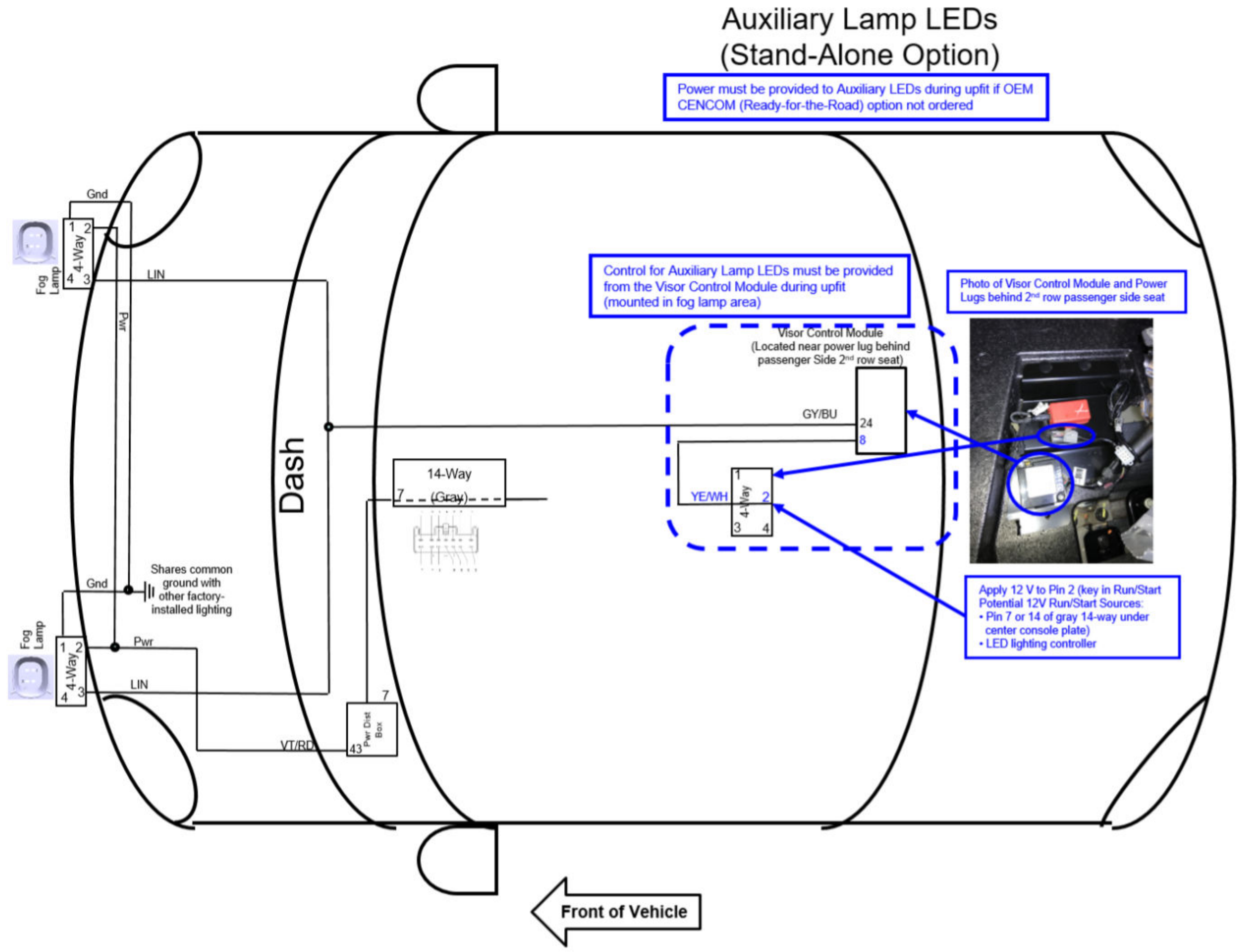
Section 5: Electrical

Police Interceptor Utility — Wiring Diagram Package Options

Front Interior Visor Light Bar (LED) Option 96W and Rear Spoiler Traffic Warning Lights (LED) Option 96T

Setup and Configuration Information in Police Bulletin P-029. https://fordbbas.com/bulletins

Auxiliary Lamp LEDs (Stand-Alone Option)


Auxiliary Lamp LEDs
(Stand-Alone Option)
Gnd
1
2
4-Way
4
3
Fog Lamp
LIN
Pwr
Dash
GY/BU
14-Way
7
(Gray)
Visor Control Module
(Located near power lug behind passenger Side 2nd row seat)
24
8
1
YE/WH
4-Way
2
3
4
Shares common ground with other factory-installed lighting
Gnd
Fog Lamp
1
2
4-Way
4
3
Pwr
LIN
7
Pwr Dist Box
43
VT/RD
Front of Vehicle

Power must be provided to Auxiliary LEDs during upfit if OEM CENCOM (Ready-for-the-Road) option not ordered

Control for Auxiliary Lamp LEDs must be provided from the Visor Control Module during upfit (mounted in fog lamp area)

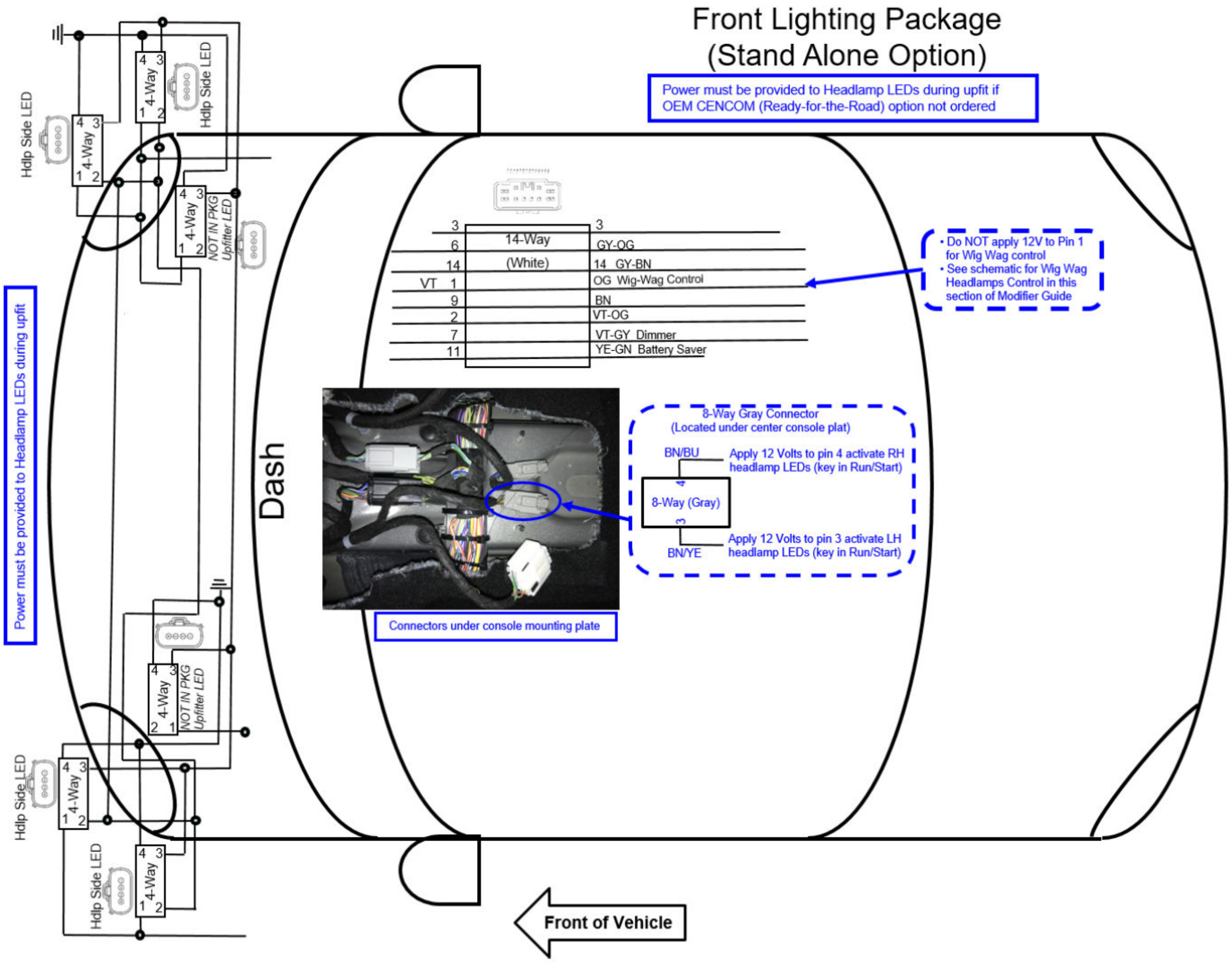
Photo of Visor Control Module and Power Lugs behind 2nd row passenger side seat

Apply 12 V to Pin 2 (key in Run/Start
Potential 12V Run/Start Sources:
- Pin 7 or 14 of gray 14-way under center console plate)
- LED lighting controller

N0184974

Section 5: Electrical

Front Lighting Package (Stand Alone Option)



Front Lighting Package
(Stand Alone Option)
Hdlp Side LED
4-Way
4 3
1 2
NOT IN PKG
Upfitter LED
Dash
14-Way
(White)
3
6 GY-OG
14 14 GY-BN
VT 1 OG Wig-Wag Control
9 BN
2 VT-OG
7 VT-GY Dimmer
11 YE-GN Battery Saver
8-Way (Gray)
BN/BU
BN/YE
Front of Vehicle

Power must be provided to Headlamp LEDs during upfit if OEM CENCOM (Ready-for-the-Road) option not ordered

Power must be provided to Headlamp LEDs during upfit

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

8-Way Gray Connector
(Located under center console plat)

Apply 12 Volts to pin 4 activate RH headlamp LEDs (key in Run/Start)

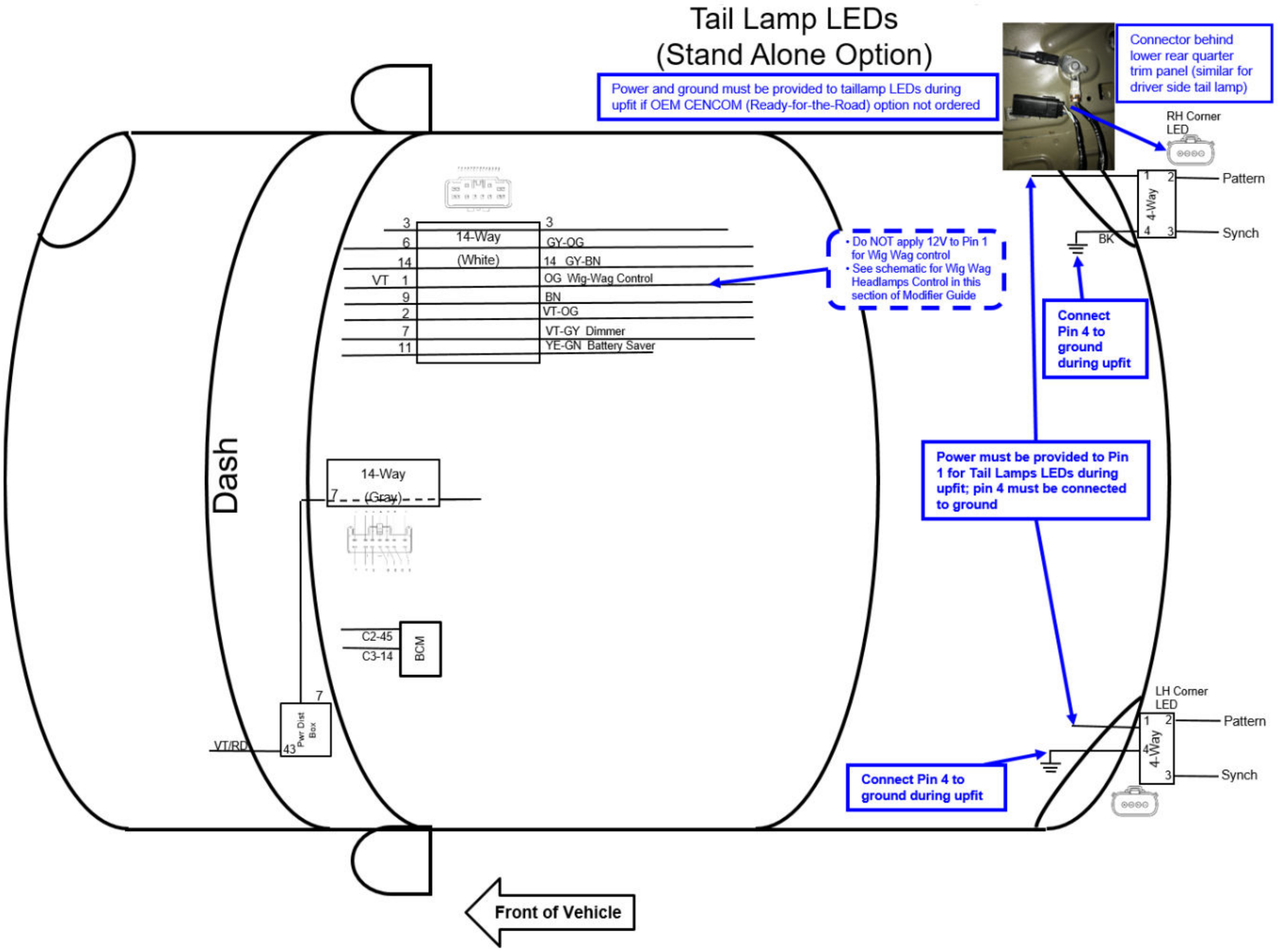
Apply 12 Volts to pin 3 activate LH headlamp LEDs (key in Run/Start)

Connectors under console mounting plate

N0184945

Section 5: Electrical

Tail Lamp LEDs (Stand-Alone Option)



Tail Lamp LEDs
(Stand Alone Option)

Power and ground must be provided to taillamp LEDs during upfit if OEM CENCOM (Ready-for-the-Road) option not ordered

Connector behind lower rear quarter trim panel (similar for driver side tail lamp)

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

Connect Pin 4 to ground during upfit

Power must be provided to Pin 1 for Tail Lamps LEDs during upfit; pin 4 must be connected to ground

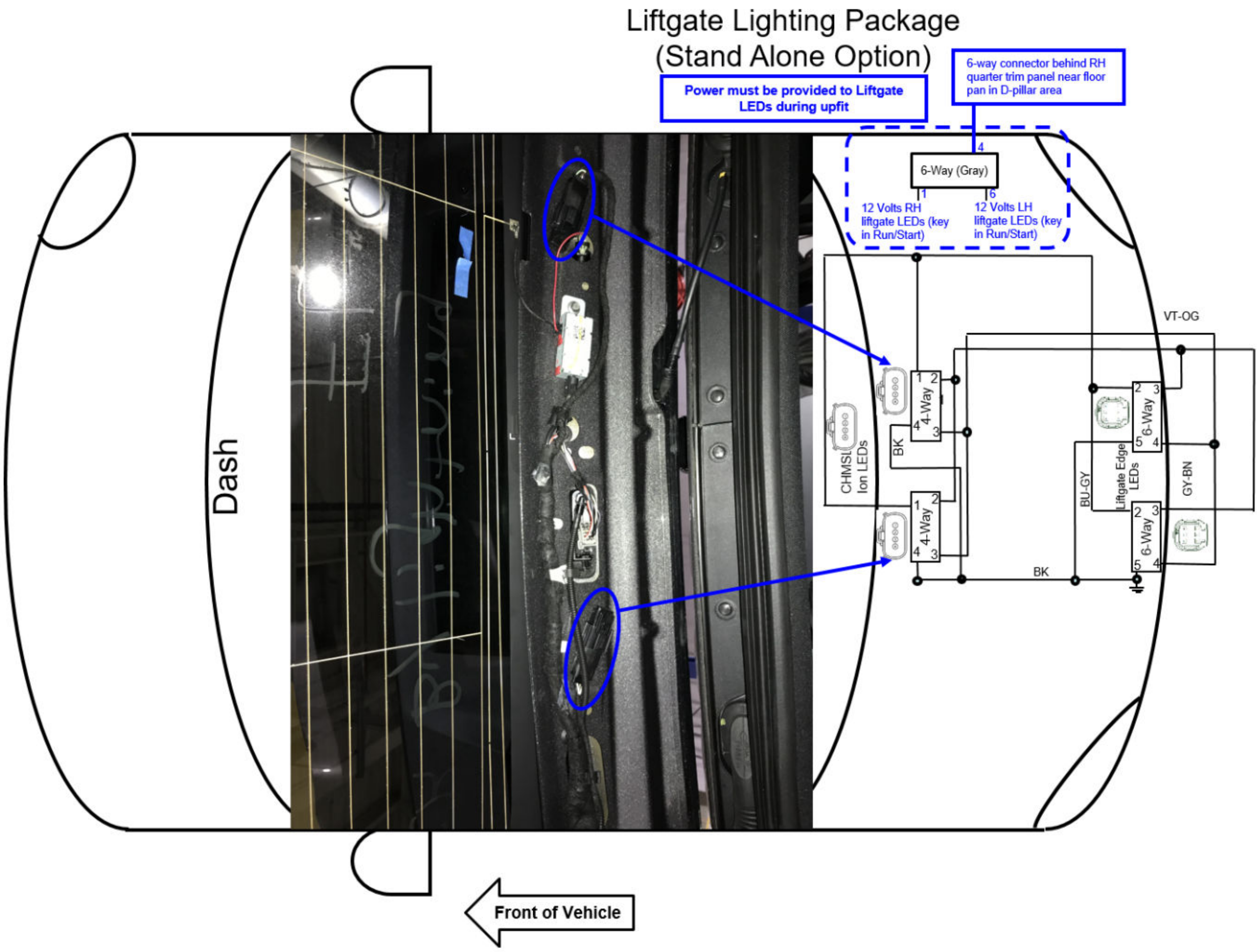
Connect Pin 4 to ground during upfit

14-Way
(White)
3
6
14
VT 1
9
2
7
11
3
GY-OG
14 GY-BN
OG Wig-Wag Control
BN
VT-OG
VT-GY Dimmer
YE-GN Battery Saver
Dash
14-Way
(Gray)
7
C2-45
C3-14
BCM
7
VT/RD
43
Pwr Dist Box
RH Corner LED
1
2
4
3
4-Way
Pattern
Synch
BK
LH Corner LED
1
2
4
3
4-Way
Pattern
Synch
Front of Vehicle

N0184946

Section 5: Electrical

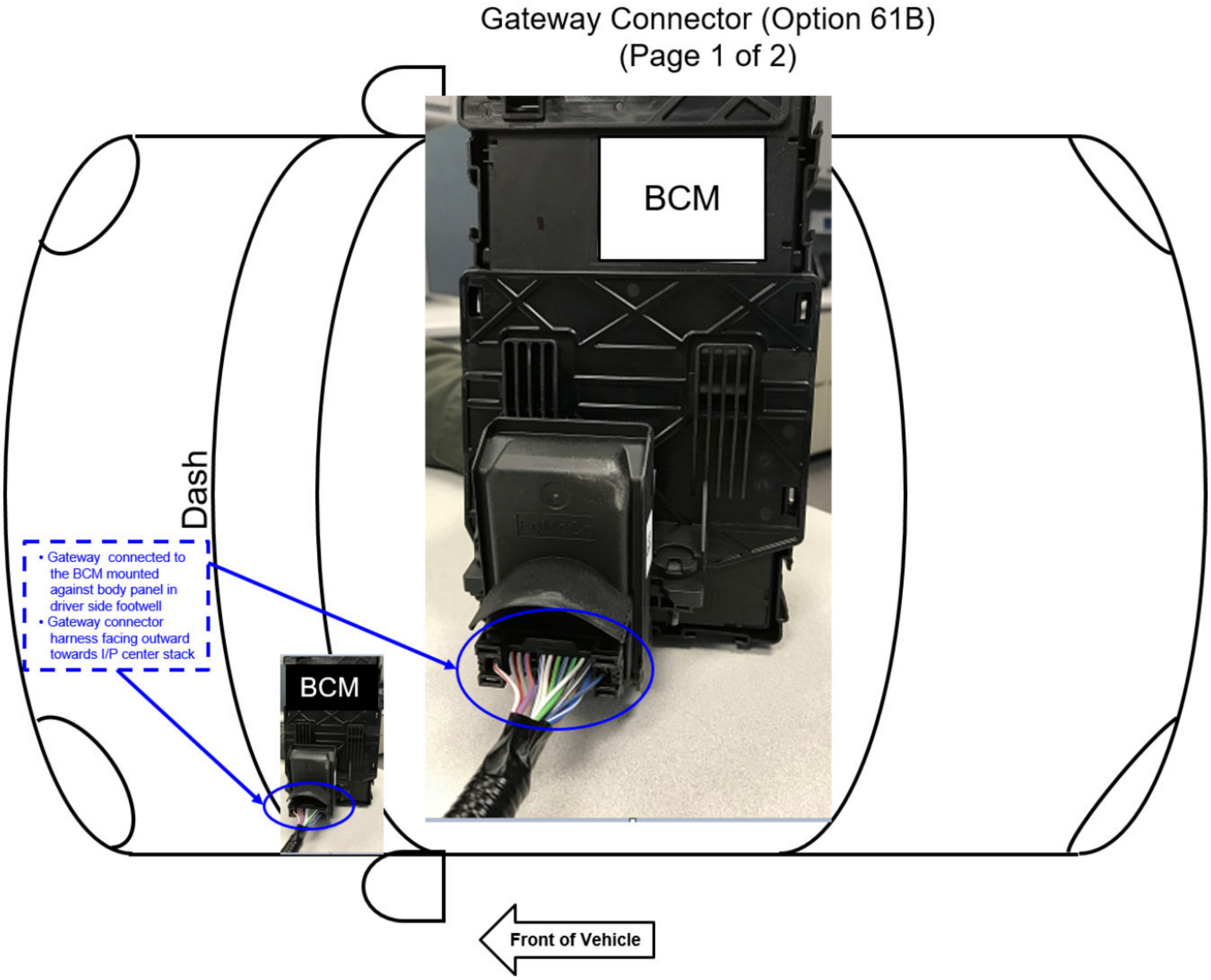
Liftgate Lighting Package (Stand-Alone Option)


Liftgate Lighting Package
(Stand Alone Option)
Power must be provided to Liftgate LEDs during upfit
6-way connector behind RH quarter trim panel near floor pan in D-pillar area
6-Way (Gray)
4
1
6
12 Volts RH liftgate LEDs (key in Run/Start)
12 Volts LH liftgate LEDs (key in Run/Start)
Dash
CHMSL Ion LEDs
4-Way
1
2
3
4
BK
VT-OG
6-Way
BU-GY
Liftgate Edge LEDs
GY-BN
5
BK
Front of Vehicle

N0184947

Section 5: Electrical

Gateway Connector (Option 61B)

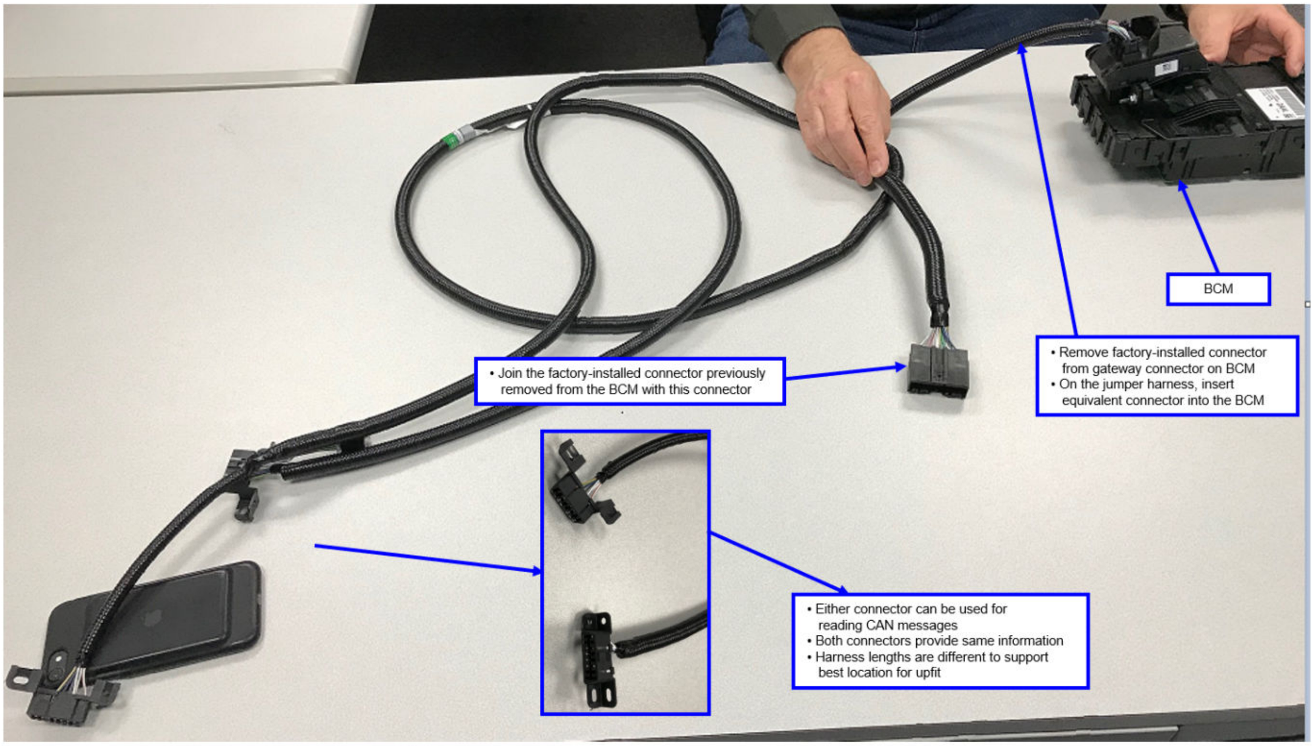

Gateway Connector (Option 61B)
(Page 1 of 2)
BCM
Dash
BCM
Front of Vehicle

- Gateway connected to the BCM mounted against body panel in driver side footwell
- Gateway connector harness facing outward towards I/P center stack

N0184948

Section 5: Electrical

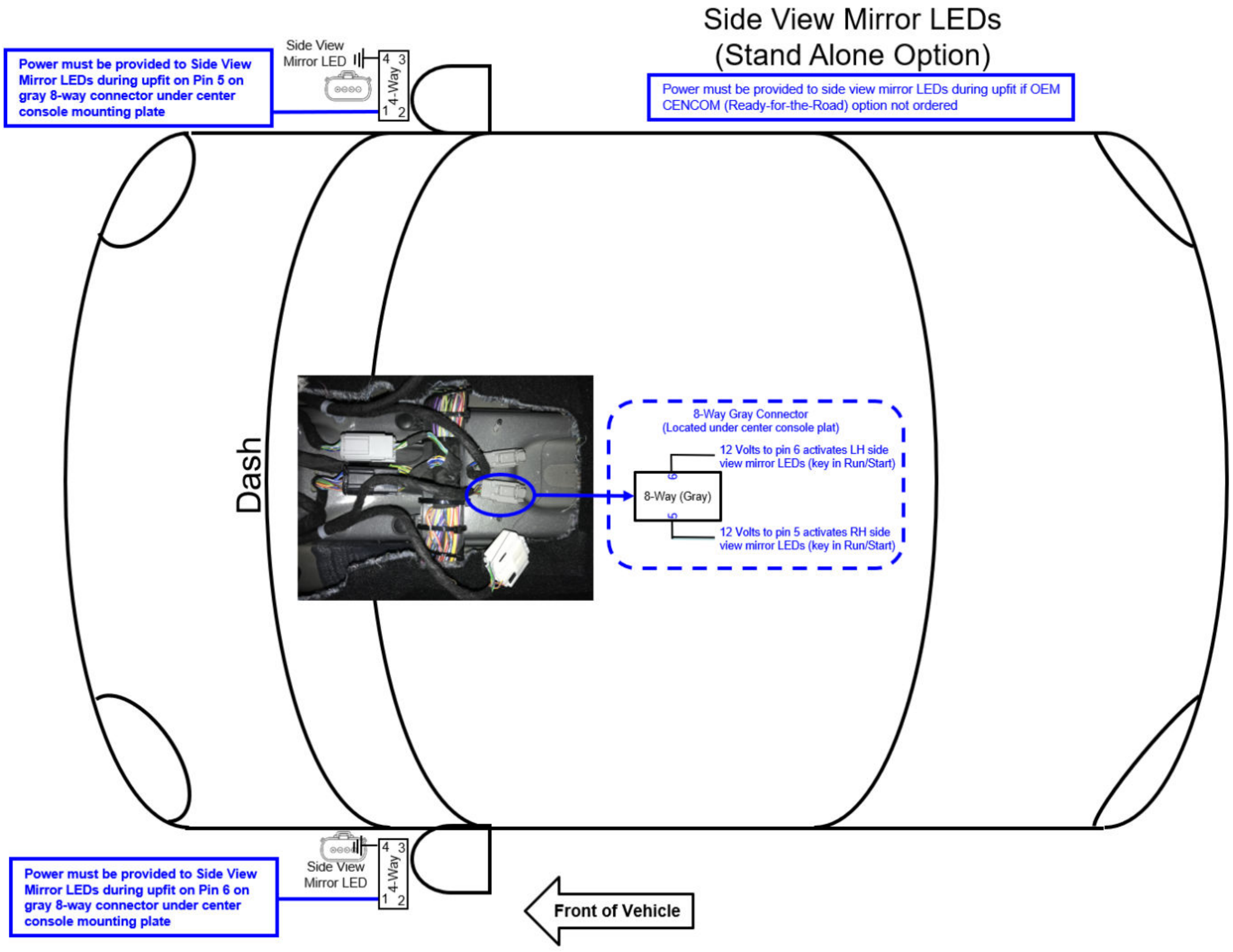
Gateway Connector (Option 61B)
(Page 2 of 2)


BCM
• Remove factory-installed connector from gateway connector on BCM
• On the jumper harness, insert equivalent connector into the BCM
• Join the factory-installed connector previously removed from the BCM with this connector
• Either connector can be used for reading CAN messages
• Both connectors provide same information
• Harness lengths are different to support best location for upfit

N0184949

Section 5: Electrical

Side View Mirror LEDs (Stand-Alone Option)


Side View Mirror LEDs
(Stand Alone Option)
Side View Mirror LED
4-Way
4 3
1 2
Dash
8-Way (Gray)
6
5
Side View Mirror LED
4-Way
4 3
1 2
Front of Vehicle

Power must be provided to Side View Mirror LEDs during upfit on Pin 5 on gray 8-way connector under center console mounting plate

Power must be provided to side view mirror LEDs during upfit if OEM CENCOM (Ready-for-the-Road) option not ordered

8-Way Gray Connector
(Located under center console plat)

12 Volts to pin 6 activates LH side view mirror LEDs (key in Run/Start)

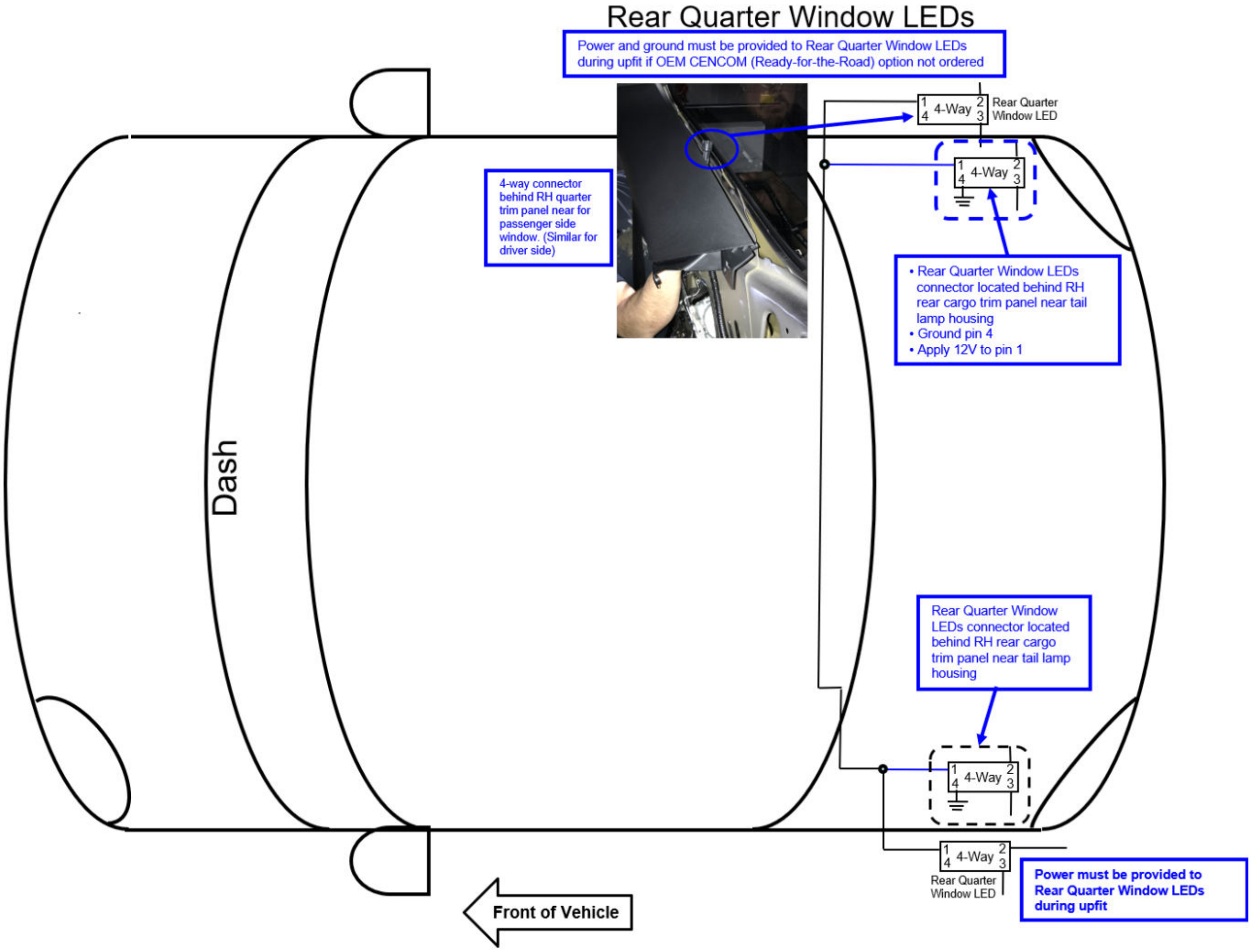
12 Volts to pin 5 activates RH side view mirror LEDs (key in Run/Start)

Power must be provided to Side View Mirror LEDs during upfit on Pin 6 on gray 8-way connector under center console mounting plate

N0184950

Section 5: Electrical

Rear Quarter Window LEDs



Rear Quarter Window LEDs

Power and ground must be provided to Rear Quarter Window LEDs during upfit if OEM CENCOM (Ready-for-the-Road) option not ordered

4-way connector behind RH quarter trim panel near for passenger side window. (Similar for driver side)

- Rear Quarter Window LEDs connector located behind RH rear cargo trim panel near tail lamp housing
- Ground pin 4
- Apply 12V to pin 1

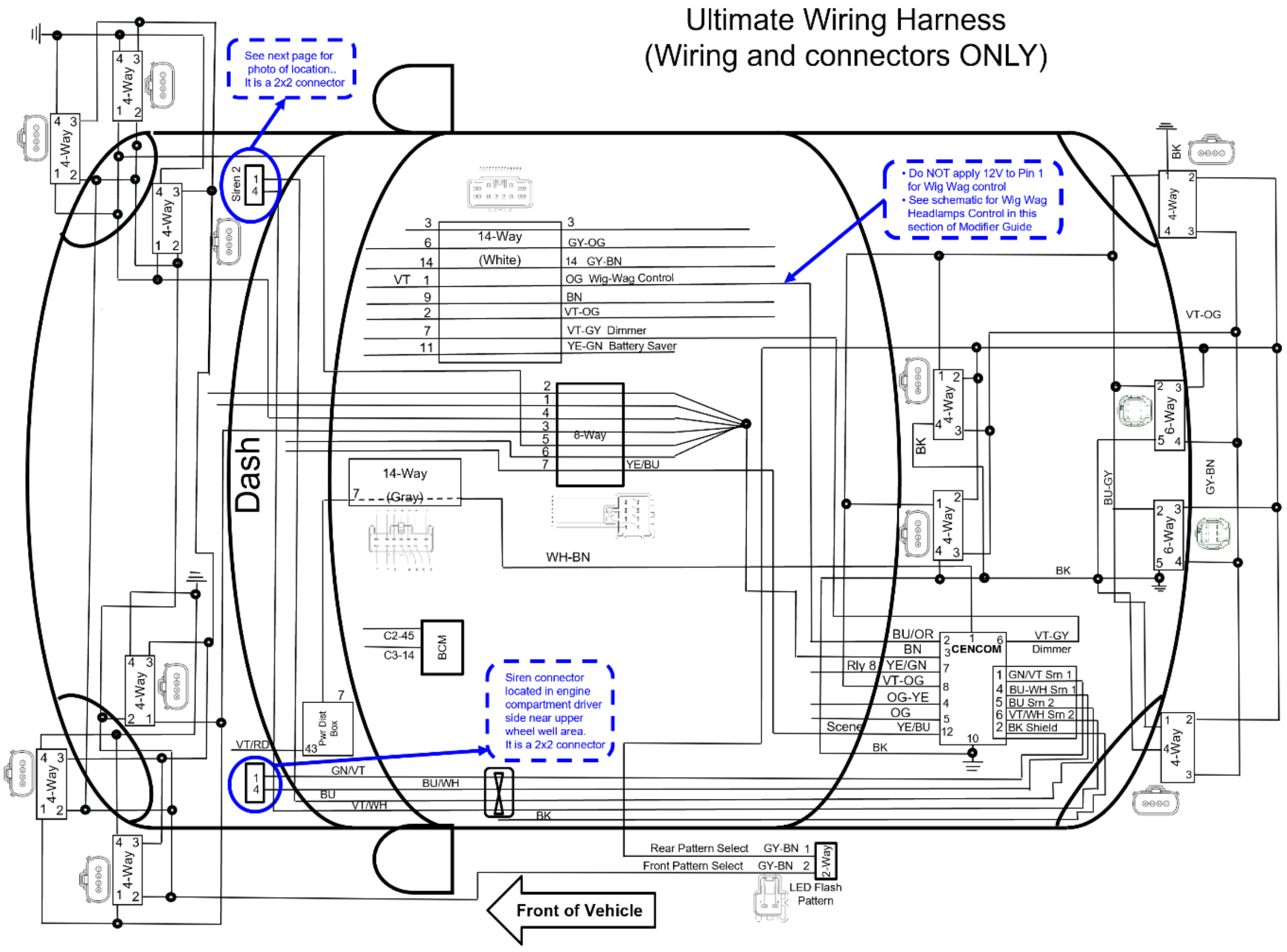
Rear Quarter Window LEDs connector located behind RH rear cargo trim panel near tail lamp housing

Power must be provided to Rear Quarter Window LEDs during upfit

N0184953

Section 5: Electrical

Ultimate Wire Harness (Wiring and connectors ONLY)



Ultimate Wiring Harness
(Wiring and connectors ONLY)

See next page for photo of location.. It is a 2x2 connector

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

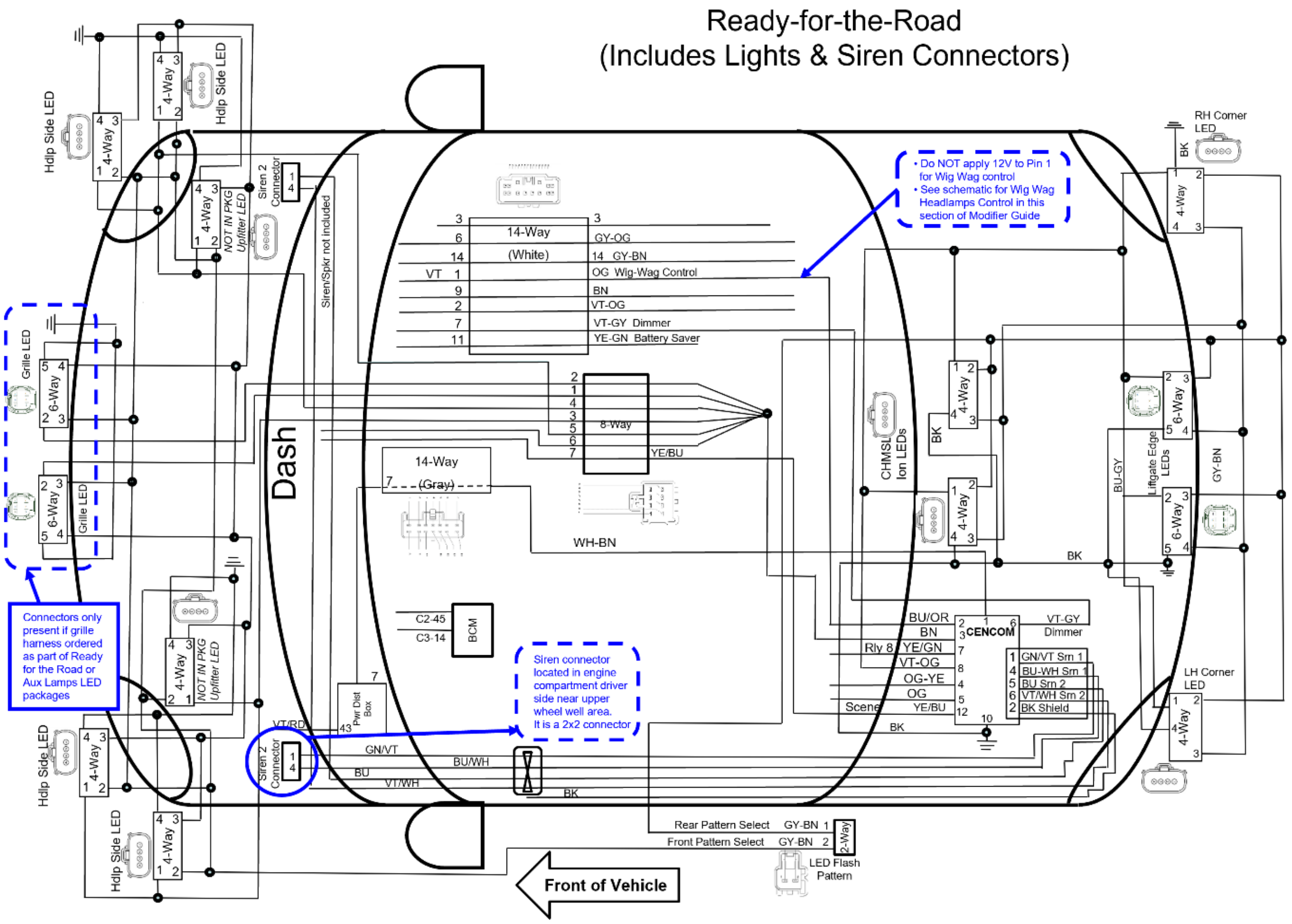
Siren connector located in engine compartment driver side near upper wheel well area. It is a 2x2 connector

Front of Vehicle
Dash
Siren 2
14-Way
(White)
3
6
14
VT 1
9
2
7
11
GY-OG
14 GY-BN
OG Wig-Wag Control
BN
VT-OG
VT-GY Dimmer
YE-GN Battery Saver
8-Way
YE/BU
14-Way
(Gray)
WH-BN
C2-45
C3-14
BCM
Pwr Dist Box
43
VT/RD
GN/VT
BU
VT/WH
BU/WH
BK
4-Way
6-Way
VT-OG
GY-BN
BU-GY
BU/OR
BN
Rly 8
YE/GN
VT-OG
OG-YE
OG
Scene
YE/BU
CENCOM
VT-GY
Dimmer
GN/VT Srn 1
BU-WH Srn 1
BU Srn 2
VT/WH Srn 2
BK Shield
Rear Pattern Select GY-BN 1
Front Pattern Select GY-BN 2
2-Way
LED Flash Pattern

N0184969

Section 5: Electrical

Ready-for-the-Road (Includes Lights and Driver Side Siren only)



Ready-for-the-Road
(Includes Lights & Siren Connectors)

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

Connectors only present if grille harness ordered as part of Ready for the Road or Aux Lamps LED packages

Siren connector located in engine compartment driver side near upper wheel well area. It is a 2x2 connector

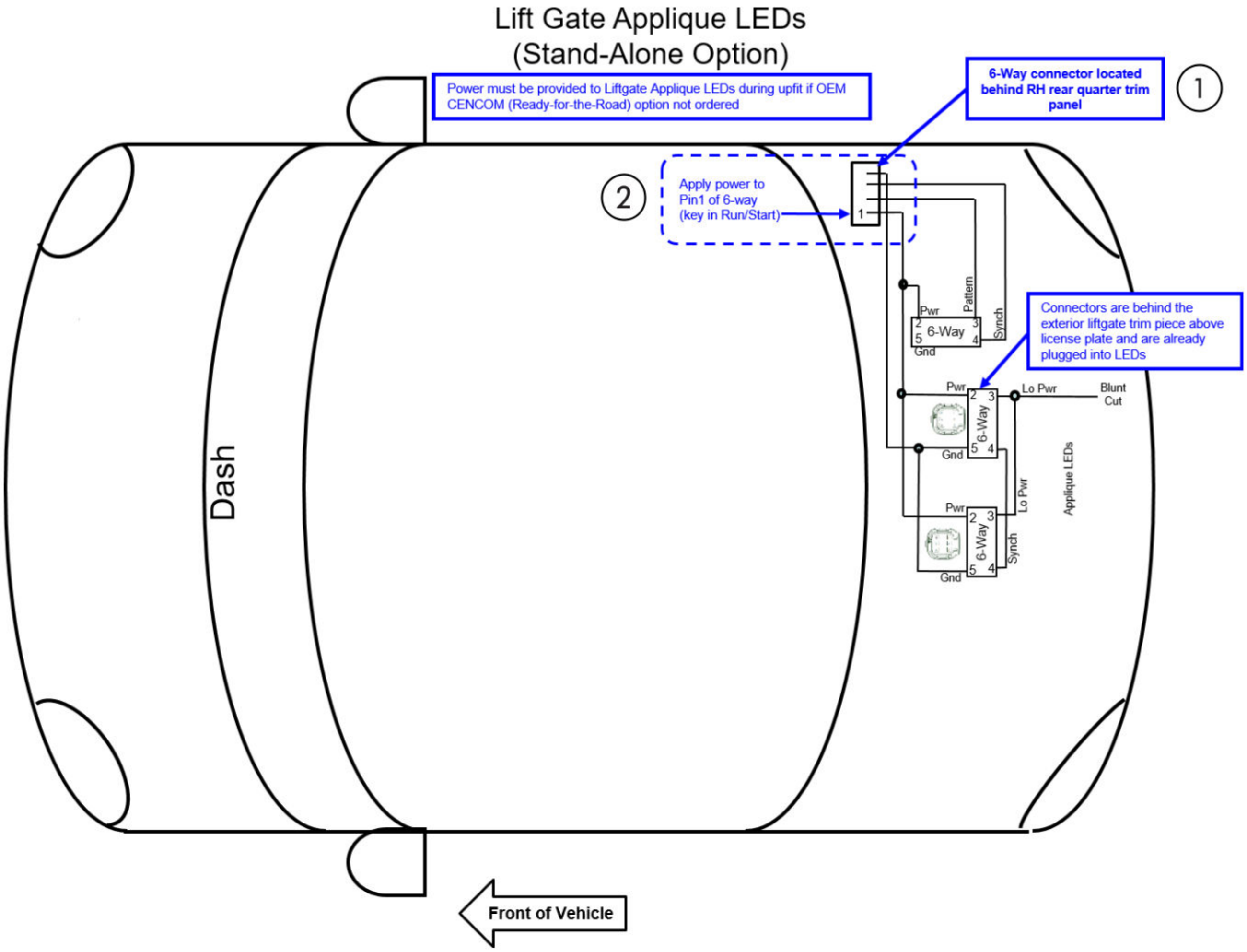
Hdlp Side LED
4-Way
NOT IN PKG
Uplifter LED
Siren 2 Connector
Siren/Spkr not included
Grille LED
6-Way
Dash
14-Way
(White)
GY-OG
GY-BN
VT
OG Wig-Wag Control
BN
VT-OG
VT-GY Dimmer
YE-GN Battery Saver
8-Way
YE/BU
14-Way
(Gray)
WH-BN
C2-45
C3-14
BCM
Pwr Dist Box
VT/RD
GN/VT
BU
BU/WH
VT/WH
BK
CHMSL
Ion LEDs
RH Corner LED
Liftgate Edge LEDs
BU-GY
GY-BN
LH Corner LED
CENCOM
BU/OR
Rly 8
YE/GN
VT-OG
OG-YE
OG
Scene
VT-GY
Dimmer
GN/VT Srn 1
BU-WH Srn 1
BU Srn 2
VT/WH Srn 2
BK Shield
Rear Pattern Select
Front Pattern Select
2-Way
LED Flash Pattern
Front of Vehicle

N0184970

Section 5: Electrical

Lift Gate Applique LEDs (Stand-Alone Option)

1. 6-way connector located behind liftgate trim on passenger side of liftgate. Should be hanked up via tear tape to applique harness.
2. Apply Power to pin 2 of 6-way (key in run/start). Pin 5 of 6-way must be grounded.



Lift Gate Applique LEDs (Stand-Alone Option)

Power must be provided to Liftgate Applique LEDs during upfit if OEM CENCOM (Ready-for-the-Road) option not ordered

① 6-Way connector located behind RH rear quarter trim panel

② Apply power to Pin1 of 6-way (key in Run/Start)

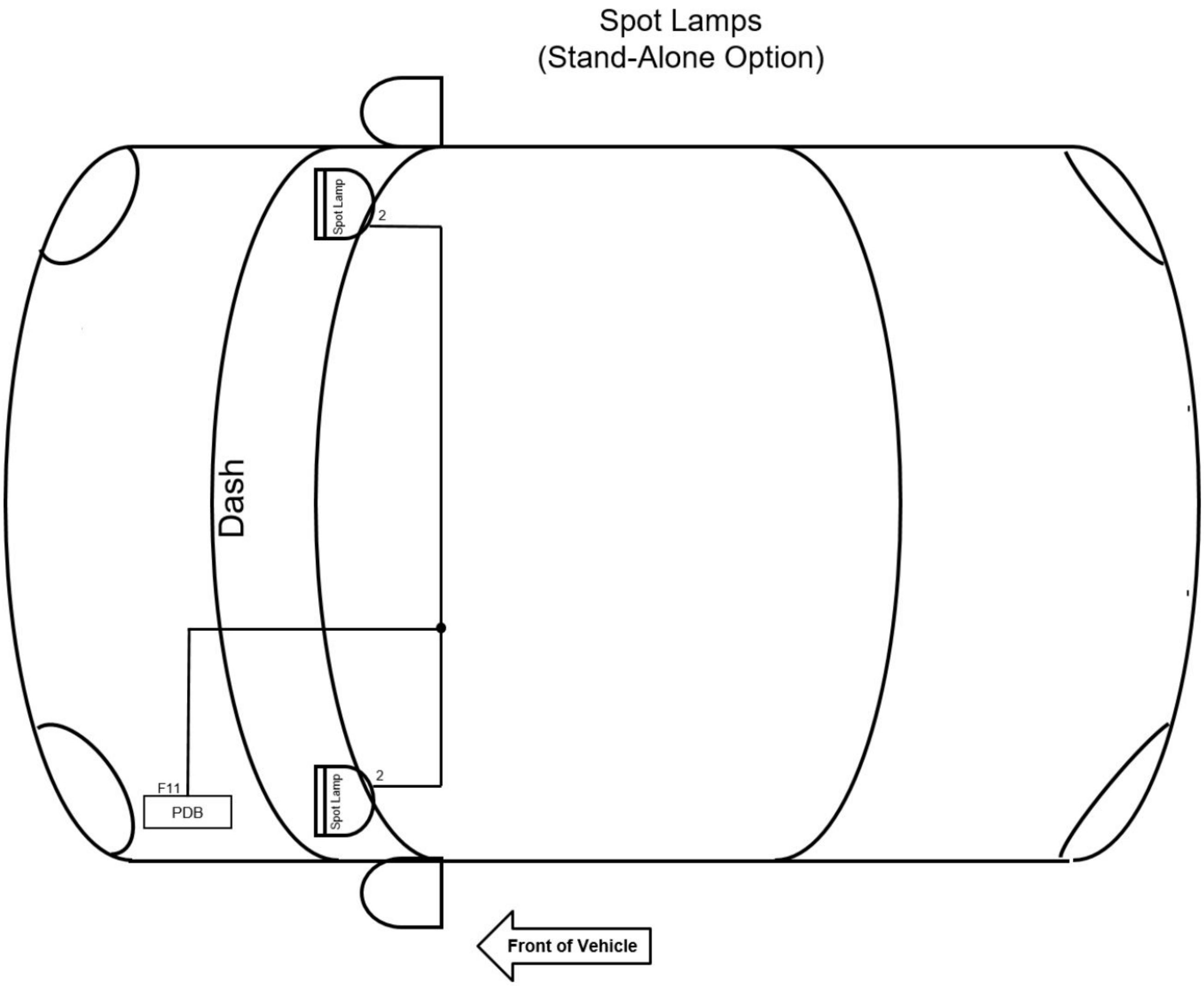
Connectors are behind the exterior liftgate trim piece above license plate and are already plugged into LEDs

Dash
1
Pwr
Pattern
Synch
2
3
5
4
6-Way
Gnd
Pwr
Lo Pwr
Blunt Cut
6-Way
Gnd
Lo Pwr
Applique LEDs
Pwr
6-Way
Synch
Gnd
Front of Vehicle

N0184975

Section 5: Electrical

Spot Lamps (Stand-Alone Option)

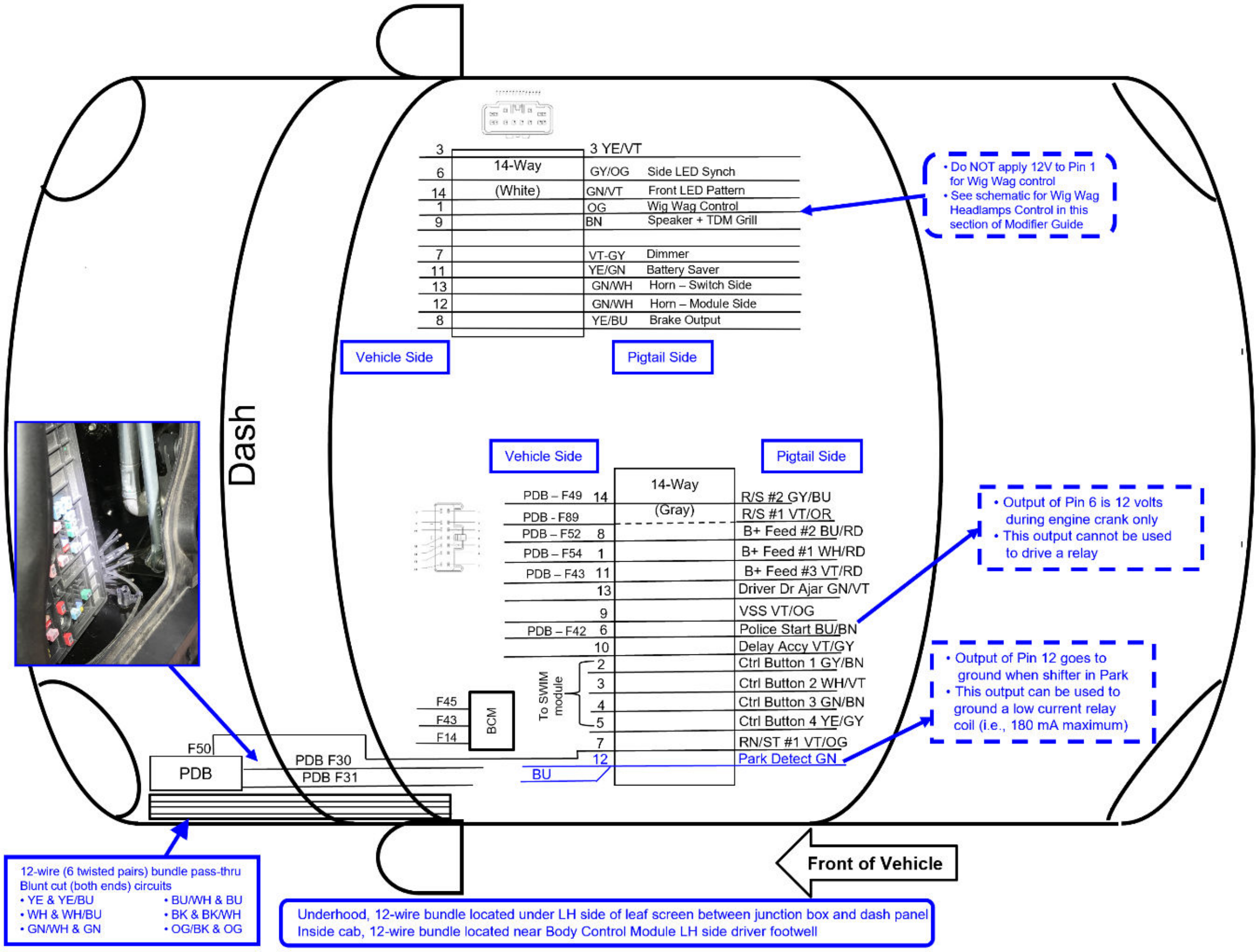

Spot Lamps
(Stand-Alone Option)
Spot Lamp
2
Dash
F11
PDB
Spot Lamp
2
Front of Vehicle

N0184957

Section 5: Electrical

Park Detect & Police Start

Park Detect & Police Start


Dash
14-Way
(White)
3
6
14
1
9
7
11
13
12
8
3 YE/VT
GY/OG Side LED Synch
GN/VT Front LED Pattern
OG Wig Wag Control
BN Speaker + TDM Grill
VT-GY Dimmer
YE/GN Battery Saver
GN/WH Horn – Switch Side
GN/WH Horn – Module Side
YE/BU Brake Output
Vehicle Side
Pigtail Side
Vehicle Side
Pigtail Side
14-Way
(Gray)
PDB – F49 14
PDB - F89
PDB – F52 8
PDB – F54 1
PDB – F43 11
13
9
PDB – F42 6
10
2
3
4
5
7
12
R/S #2 GY/BU
R/S #1 VT/OR
B+ Feed #2 BU/RD
B+ Feed #1 WH/RD
B+ Feed #3 VT/RD
Driver Dr Ajar GN/VT
VSS VT/OG
Police Start BU/BN
Delay Accy VT/GY
Ctrl Button 1 GY/BN
Ctrl Button 2 WH/VT
Ctrl Button 3 GN/BN
Ctrl Button 4 YE/GY
RN/ST #1 VT/OG
Park Detect GN
To SWIM module
F45
F43
F14
BCM
BU
F50
PDB
PDB F30
PDB F31
Front of Vehicle

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

- Output of Pin 6 is 12 volts during engine crank only
- This output cannot be used to drive a relay

- Output of Pin 12 goes to ground when shifter in Park
- This output can be used to ground a low current relay coil (i.e., 180 mA maximum)

12-wire (6 twisted pairs) bundle pass-thru
Blunt cut (both ends) circuits

YE & YE/BU	BU/WH & BU
WH & WH/BU	BK & BK/WH
GN/WH & GN	OG/BK & OG

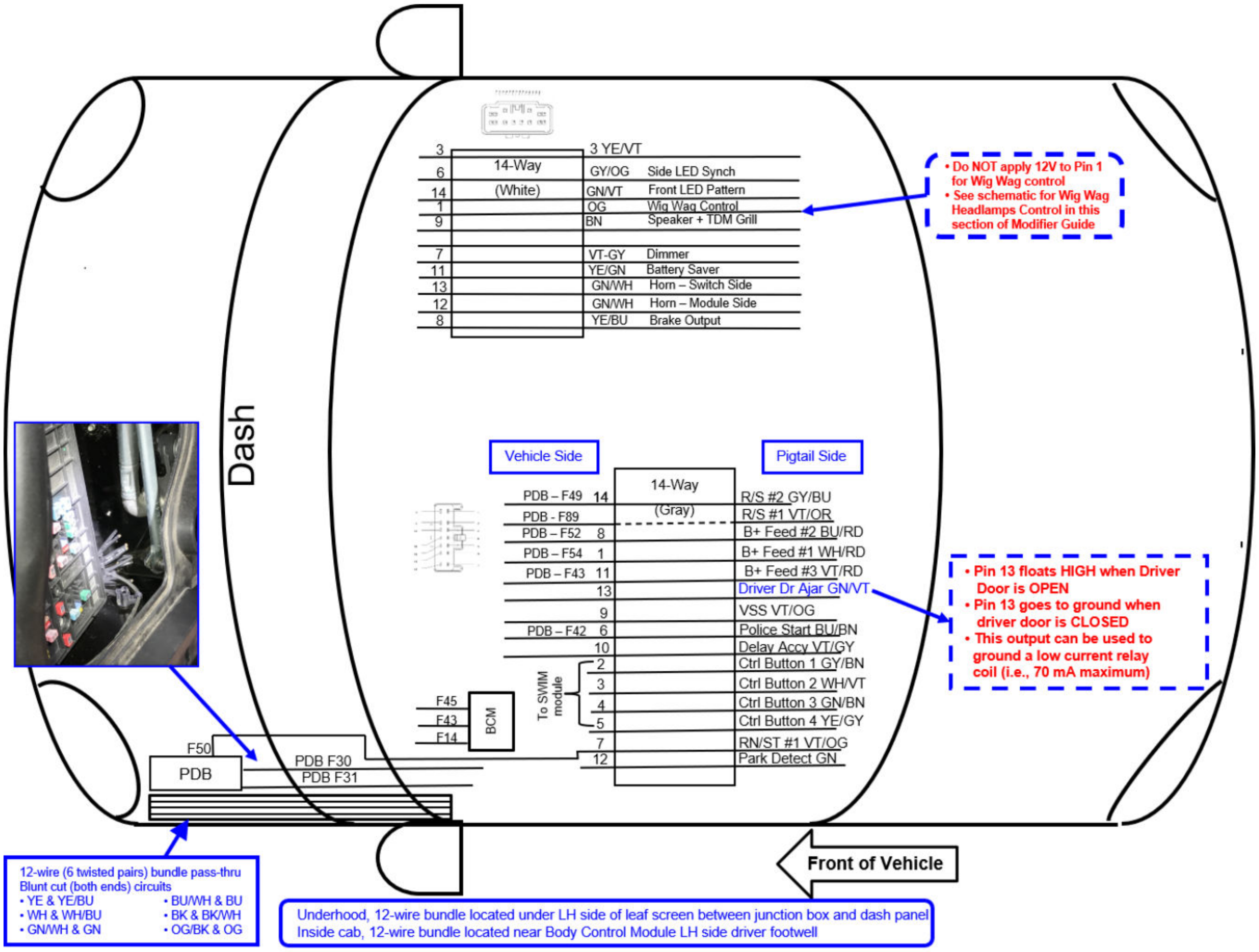
Underhood, 12-wire bundle located under LH side of leaf screen between junction box and dash panel
Inside cab, 12-wire bundle located near Body Control Module LH side driver footwell

N0184959

Section 5: Electrical

Driver Door Ajar

Driver Door Ajar
(part 1 of 5 - continued on next page)


3
14-Way
(White)
3 YE/VT
6 GY/OG Side LED Synch
14 GN/VT Front LED Pattern
1 OG Wig Wag Control
9 BN Speaker + TDM Grill
7 VT-GY Dimmer
11 YE/GN Battery Saver
13 GN/WH Horn – Switch Side
12 GN/WH Horn – Module Side
8 YE/BU Brake Output
Dash
Vehicle Side
Pigtail Side
14-Way
(Gray)
PDB – F49 14 R/S #2 GY/BU
PDB - F89 R/S #1 VT/OR
PDB – F52 8 B+ Feed #2 BU/RD
PDB – F54 1 B+ Feed #1 WH/RD
PDB – F43 11 B+ Feed #3 VT/RD
13 Driver Dr Ajar GN/VT
9 VSS VT/OG
PDB – F42 6 Police Start BU/BN
10 Delay Accy VT/GY
2 Ctrl Button 1 GY/BN
3 Ctrl Button 2 WH/VT
4 Ctrl Button 3 GN/BN
5 Ctrl Button 4 YE/GY
To SWIM module
7 RN/ST #1 VT/OG
12 Park Detect GN
F45
F43
F14
BCM
F50
PDB
PDB F30
PDB F31
Front of Vehicle

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

- Pin 13 floats HIGH when Driver Door is OPEN
- Pin 13 goes to ground when driver door is CLOSED
- This output can be used to ground a low current relay coil (i.e., 70 mA maximum)

12-wire (6 twisted pairs) bundle pass-thru
Blunt cut (both ends) circuits

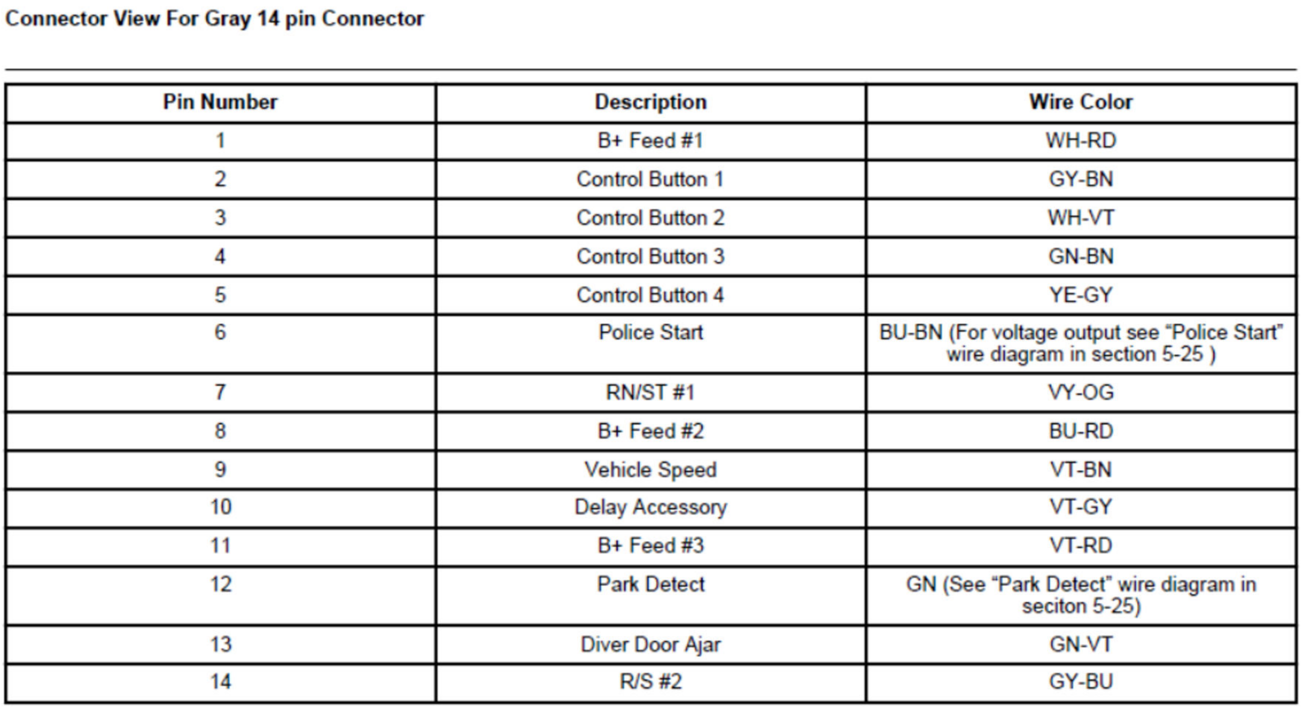
• YE & YE/BU	• BU/WH & BU
• WH & WH/BU	• BK & BK/WH
• GN/WH & GN	• OG/BK & OG

Underhood, 12-wire bundle located under LH side of leaf screen between junction box and dash panel
Inside cab, 12-wire bundle located near Body Control Module LH side driver footwell

N0184960

Section 5: Electrical

Driver Door Ajar
(part 2 of 5 - continued on next page)



Connector View For Gray 14 pin Connector

Pin Number	Description	Wire Color
1	B+ Feed #1	WH-RD
2	Control Button 1	GY-BN
3	Control Button 2	WH-VT
4	Control Button 3	GN-BN
5	Control Button 4	YE-GY
6	Police Start	BU-BN (For voltage output see "Police Start" wire diagram in section 5-25)
7	RN/ST #1	VY-OG
8	B+ Feed #2	BU-RD
9	Vehicle Speed	VT-BN
10	Delay Accessory	VT-GY
11	B+ Feed #3	VT-RD
12	Park Detect	GN (See "Park Detect" wire diagram in seciton 5-25)
13	Diver Door Ajar	GN-VT
14	R/S #2	GY-BU

N0184961

Section 5: Electrical

Driver Door Ajar
(part 3 of 5 - continued on next page)

2020MY and beyond Police Interceptor Utility Driver's Door Ajar Circuit

Models Affected
2020MY and beyond Police Interceptors Utilities

Purpose
To provide information regarding access to the driver's door ajar circuit on 2020MY and beyond Police Interceptors Utility vehicles (reference Police Modifier's Guide pg. 5-26)

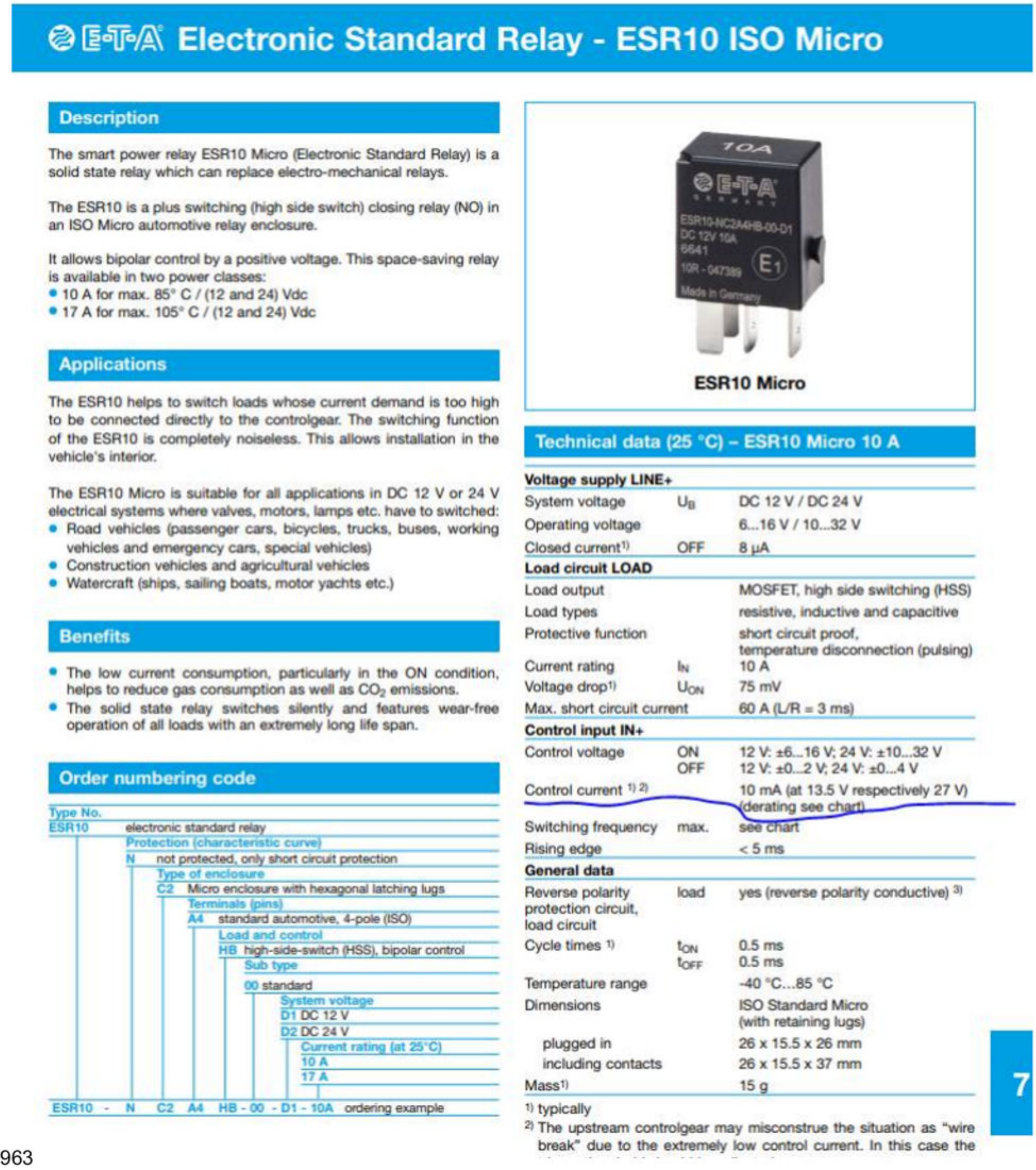
When using pin 13 on the factory 14 way connector to access the driver's door ajar circuit, a 70 mA maximum coil current relay with an integrated clamping diode is required to protect against damage to the door latch.

An example of this would be ETA solid state Electronic Standard Relay ESR 10 Iso Micro solid state automotive relay.

N0184962

Section 5: Electrical

Driver Door Ajar
(part 4 of 5 - continued on next page)



E-T-A Electronic Standard Relay - ESR10 ISO Micro

Description

The smart power relay ESR10 Micro (Electronic Standard Relay) is a solid state relay which can replace electro-mechanical relays.

The ESR10 is a plus switching (high side switch) closing relay (NO) in an ISO Micro automotive relay enclosure.

It allows bipolar control by a positive voltage. This space-saving relay is available in two power classes:
- 10 A for max. 85° C / (12 and 24) Vdc
- 17 A for max. 105° C / (12 and 24) Vdc

Applications

The ESR10 helps to switch loads whose current demand is too high to be connected directly to the controlgear. The switching function of the ESR10 is completely noiseless. This allows installation in the vehicle's interior.

The ESR10 Micro is suitable for all applications in DC 12 V or 24 V electrical systems where valves, motors, lamps etc. have to switched:
- Road vehicles (passenger cars, bicycles, trucks, buses, working vehicles and emergency cars, special vehicles)
- Construction vehicles and agricultural vehicles
- Watercraft (ships, sailing boats, motor yachts etc.)

Benefits

- The low current consumption, particularly in the ON condition, helps to reduce gas consumption as well as CO_2 emissions.
- The solid state relay switches silently and features wear-free operation of all loads with an extremely long life span.

Order numbering code

Type No.
ESR10 electronic standard relay
  Protection (characteristic curve)
  N not protected, only short circuit protection
    Type of enclosure
    C2 Micro enclosure with hexagonal latching lugs
      Terminals (pins)
      A4 standard automotive, 4-pole (ISO)
        Load and control
        HB high-side-switch (HSS), bipolar control
          Sub type
          00 standard
            System voltage
            D1 DC 12 V
            D2 DC 24 V
              Current rating (at 25°C)
              10 A
              17 A
ESR10 - N C2 A4 HB - 00 - D1 - 10A ordering example

ESR10 Micro

Technical data (25 °C) – ESR10 Micro 10 A

Voltage supply LINE+		
System voltage	U_B	DC 12 V / DC 24 V
Operating voltage		6...16 V / 10...32 V
Closed current[1]	OFF	8 µA
Load circuit LOAD		
Load output		MOSFET, high side switching (HSS)
Load types		resistive, inductive and capacitive
Protective function		short circuit proof, temperature disconnection (pulsing)
Current rating	I_N	10 A
Voltage drop[1]	U_{ON}	75 mV
Max. short circuit current		60 A (L/R = 3 ms)
Control input IN+		
Control voltage	ON OFF	12 V: ±6...16 V; 24 V: ±10...32 V 12 V: ±0...2 V; 24 V: ±0...4 V
Control current [1] [2]		10 mA (at 13.5 V respectively 27 V) (derating see chart)
Switching frequency	max.	see chart
Rising edge		< 5 ms
General data		
Reverse polarity protection circuit, load circuit	load	yes (reverse polarity conductive) [3]
Cycle times [1]	t_{ON} t_{OFF}	0.5 ms 0.5 ms
Temperature range		-40 °C...85 °C
Dimensions		ISO Standard Micro (with retaining lugs)
plugged in		26 x 15.5 x 26 mm
including contacts		26 x 15.5 x 37 mm
Mass[1]		15 g

[1] typically

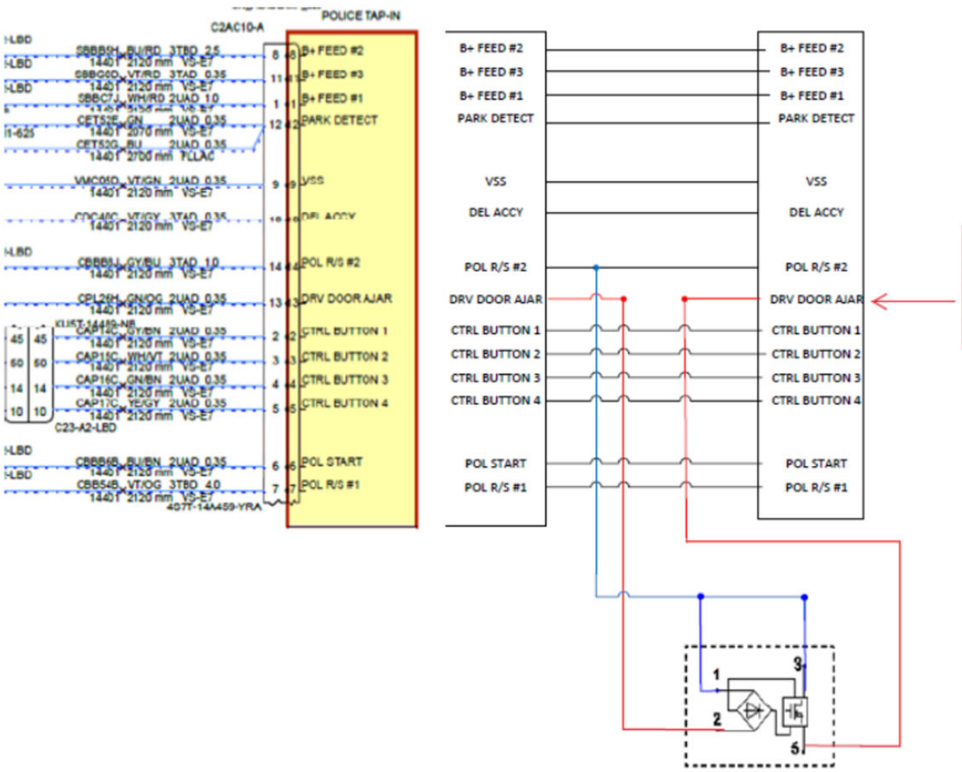
[2] The upstream controlgear may misconstrue the situation as "wire break" due to the extremely low control current. In this case the

7

N0184963

Section 5: Electrical

Driver Door Ajar
(part 5 of 5)


POLICE TAP-IN
C2AC10-A
SBBB5H BU/RD 3TBD 2.5 14401 2120 mm VS-E7
SBBC0D VT/RD 3TAD 0.35 14401 2120 mm VS-E7
SBBC7J WH/RD 2UAD 1.0
CET52E GN 2UAD 0.35 14401 2070 mm VS-E7
CET52G BU 2UAD 0.35 14401 2700 mm FLLAC
VMC05D VT/GN 2UAD 0.35 14401 2120 mm VS-E7
CDC40C VT/GY 3TAD 0.35 14401 2120 mm VS-E7
CBBB8J GY/BU 3TAD 1.0 14401 2120 mm VS-E7
CPL26H GN/OG 2UAD 0.35 14401 2120 mm VS-E7
KU5T-14489-NB
CAP14C GY/BN 2UAD 0.35 14401 2120 mm VS-E7
CAP15C WH/VT 2UAD 0.35 14401 2120 mm VS-E7
CAP16C GN/BN 2UAD 0.35 14401 2120 mm VS-E7
CAP17C YE/GY 2UAD 0.35 14401 2120 mm VS-E7
C23-A2-LBD
CBBB6B BU/BN 2UAD 0.35 14401 2120 mm VS-E7
CBB54B VT/OG 3TBD 4.0 14401 2120 mm VS-E7
4G7T-14A459-YRA
45 45
60 60
14 14
10 10
8 8 B+ FEED #2
11 11 B+ FEED #3
1 1 B+ FEED #1
12 12 PARK DETECT
9 9 VSS
10 10 DEL ACCY
14 14 POL R/S #2
13 13 DRV DOOR AJAR
2 2 CTRL BUTTON 1
3 3 CTRL BUTTON 2
4 4 CTRL BUTTON 3
5 5 CTRL BUTTON 4
6 6 POL START
7 7 POL R/S #1
B+ FEED #2
B+ FEED #3
B+ FEED #1
PARK DETECT
VSS
DEL ACCY
POL R/S #2
DRV DOOR AJAR
CTRL BUTTON 1
CTRL BUTTON 2
CTRL BUTTON 3
CTRL BUTTON 4
POL START
POL R/S #1
1
2
3
5

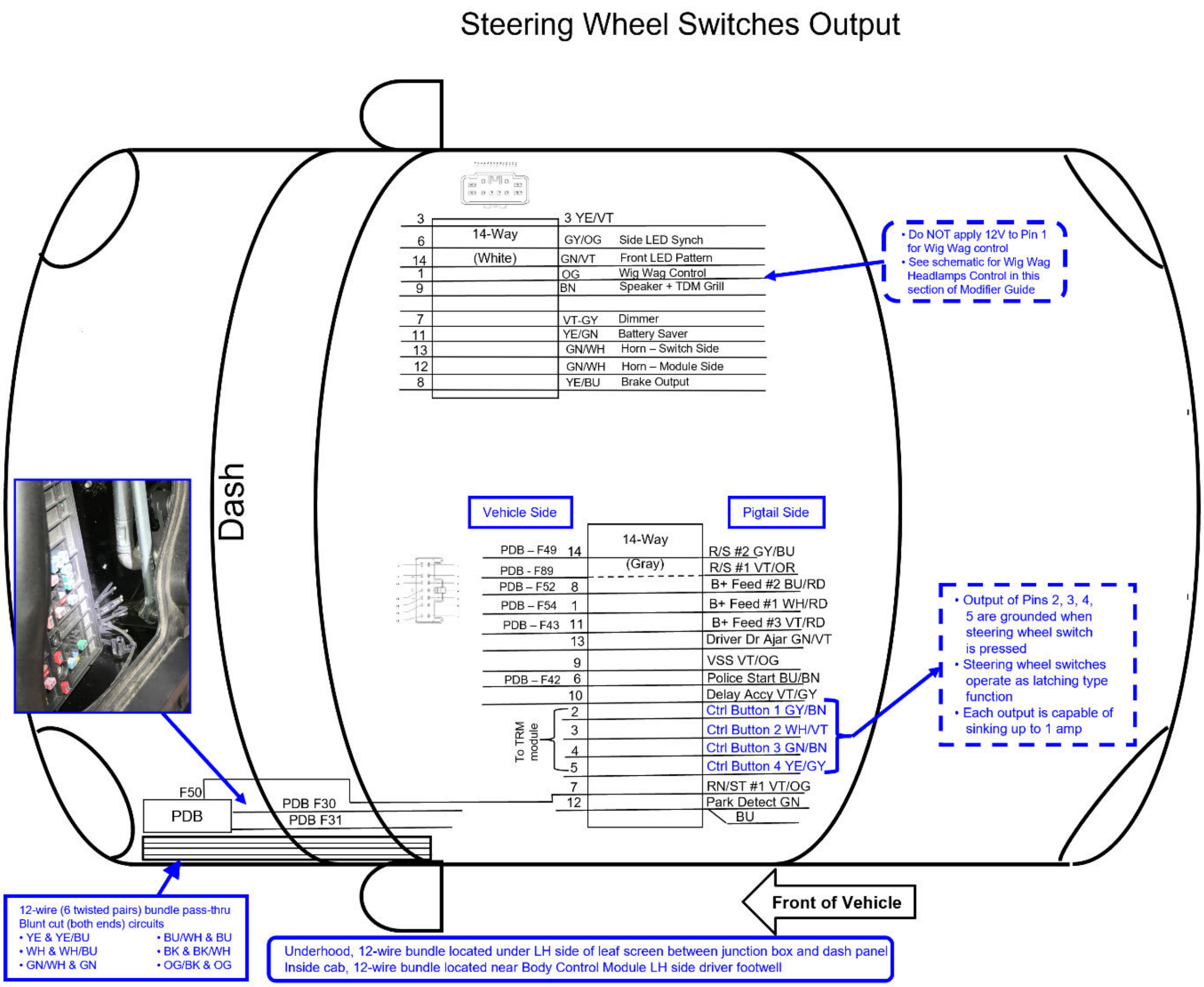
Note:

With this solution, the DRV DOOR AJAR circuit will be 12V when the Driver Door is closed and the key is in the Run/Start position. When the Key is OFF or the Driver Door is Open the DRV DOOR AJAR circuit will be Open

N0184964

Section 5: Electrical

Steering Wheel Switches Output


14-Way
(White)
3 3 YE/VT
6 GY/OG Side LED Synch
14 GN/VT Front LED Pattern
1 OG Wig Wag Control
9 BN Speaker + TDM Grill
7 VT-GY Dimmer
11 YE/GN Battery Saver
13 GN/WH Horn – Switch Side
12 GN/WH Horn – Module Side
8 YE/BU Brake Output
Dash
Vehicle Side
Pigtail Side
14-Way
(Gray)
PDB – F49 14 R/S #2 GY/BU
PDB - F89 R/S #1 VT/OR
PDB – F52 8 B+ Feed #2 BU/RD
PDB – F54 1 B+ Feed #1 WH/RD
PDB – F43 11 B+ Feed #3 VT/RD
13 Driver Dr Ajar GN/VT
9 VSS VT/OG
PDB – F42 6 Police Start BU/BN
10 Delay Accy VT/GY
To TRM module
2 Ctrl Button 1 GY/BN
3 Ctrl Button 2 WH/VT
4 Ctrl Button 3 GN/BN
5 Ctrl Button 4 YE/GY
7 RN/ST #1 VT/OG
12 Park Detect GN
BU
F50
PDB
PDB F30
PDB F31
Front of Vehicle

Steering Wheel Switches Output

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

- Output of Pins 2, 3, 4, 5 are grounded when steering wheel switch is pressed
- Steering wheel switches operate as latching type function
- Each output is capable of sinking up to 1 amp

12-wire (6 twisted pairs) bundle pass-thru
Blunt cut (both ends) circuits
- YE & YE/BU
- WH & WH/BU
- GN/WH & GN
- BU/WH & BU
- BK & BK/WH
- OG/BK & OG

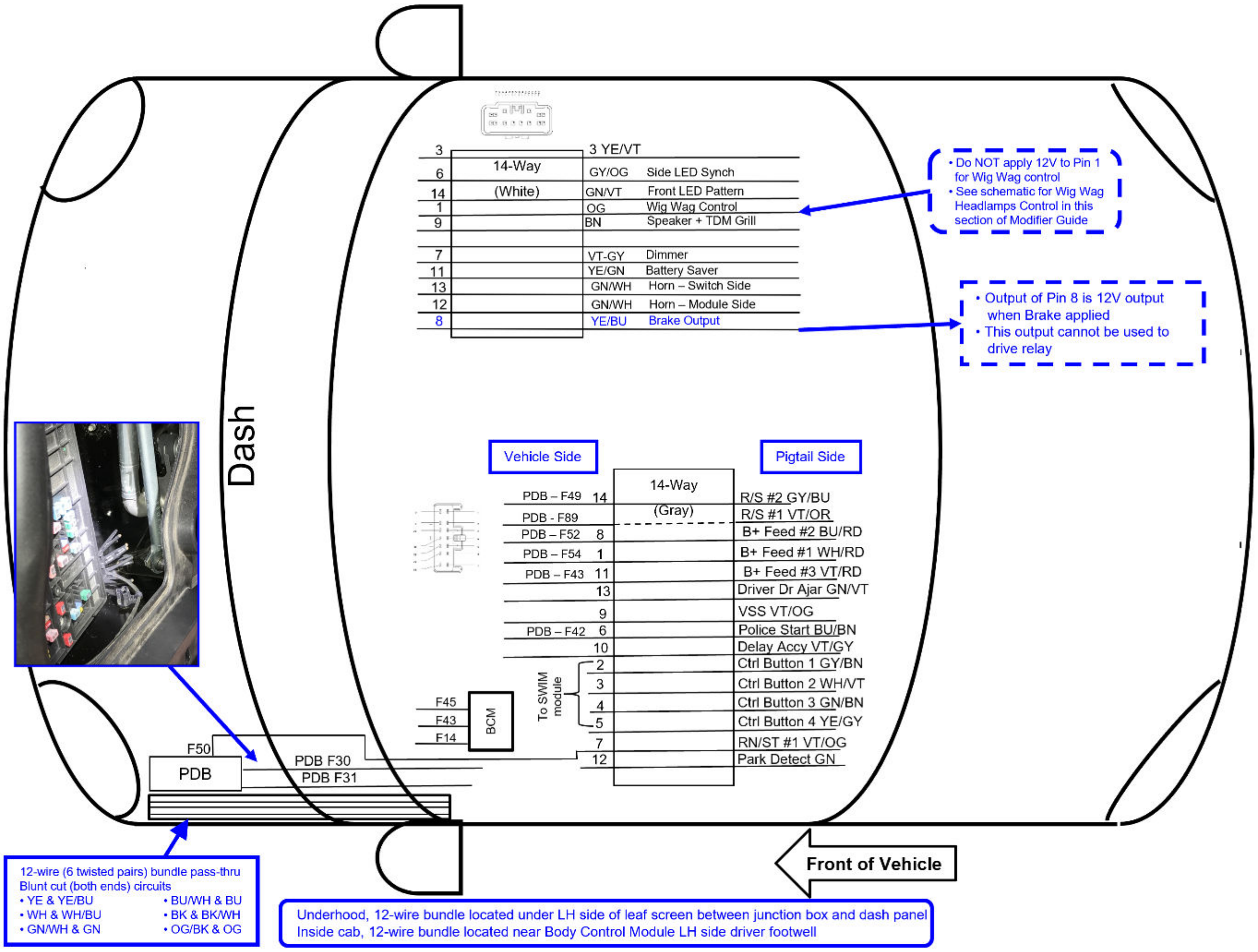
Underhood, 12-wire bundle located under LH side of leaf screen between junction box and dash panel
Inside cab, 12-wire bundle located near Body Control Module LH side driver footwell

N0184965

Section 5: Electrical

Brake Output

Brake Output


14-Way
(White)
3 3 YE/VT
6 GY/OG Side LED Synch
14 GN/VT Front LED Pattern
1 OG Wig Wag Control
9 BN Speaker + TDM Grill
7 VT-GY Dimmer
11 YE/GN Battery Saver
13 GN/WH Horn – Switch Side
12 GN/WH Horn – Module Side
8 YE/BU Brake Output
Dash
Vehicle Side
Pigtail Side
14-Way
(Gray)
PDB – F49 14 R/S #2 GY/BU
PDB - F89 R/S #1 VT/OR
PDB – F52 8 B+ Feed #2 BU/RD
PDB – F54 1 B+ Feed #1 WH/RD
PDB – F43 11 B+ Feed #3 VT/RD
13 Driver Dr Ajar GN/VT
9 VSS VT/OG
PDB – F42 6 Police Start BU/BN
10 Delay Accy VT/GY
2 Ctrl Button 1 GY/BN
3 Ctrl Button 2 WH/VT
4 Ctrl Button 3 GN/BN
5 Ctrl Button 4 YE/GY
7 RN/ST #1 VT/OG
12 Park Detect GN
To SWIM module
BCM
F45
F43
F14
F50
PDB
PDB F30
PDB F31
Front of Vehicle

- Do NOT apply 12V to Pin 1 for Wig Wag control
- See schematic for Wig Wag Headlamps Control in this section of Modifier Guide

- Output of Pin 8 is 12V output when Brake applied
- This output cannot be used to drive relay

12-wire (6 twisted pairs) bundle pass-thru
Blunt cut (both ends) circuits

• YE & YE/BU	• BU/WH & BU
• WH & WH/BU	• BK & BK/WH
• GN/WH & GN	• OG/BK & OG

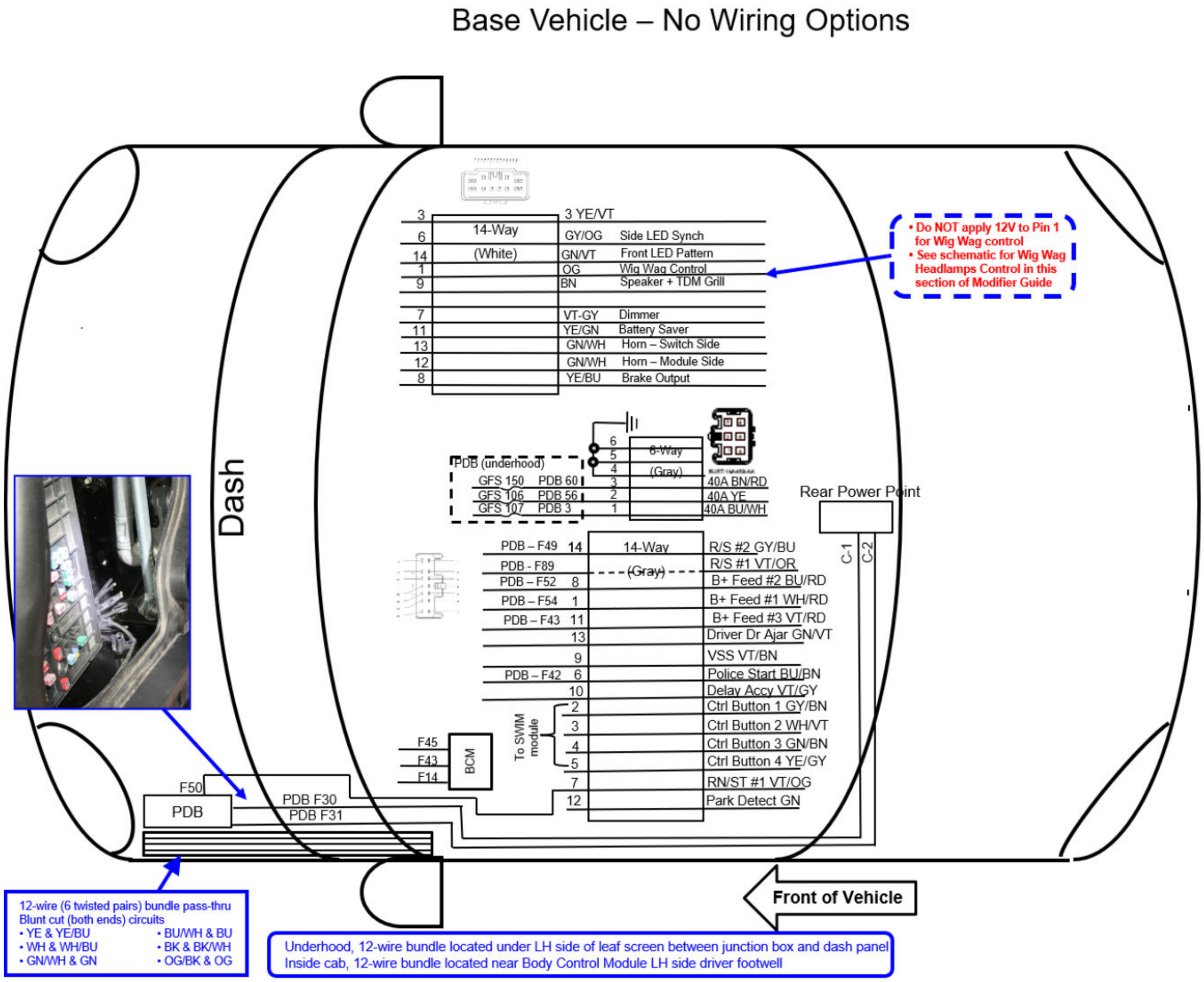
Underhood, 12-wire bundle located under LH side of leaf screen between junction box and dash panel
Inside cab, 12-wire bundle located near Body Control Module LH side driver footwell

N0184966

Section 5: Electrical

Base Vehicle — No Wiring Options

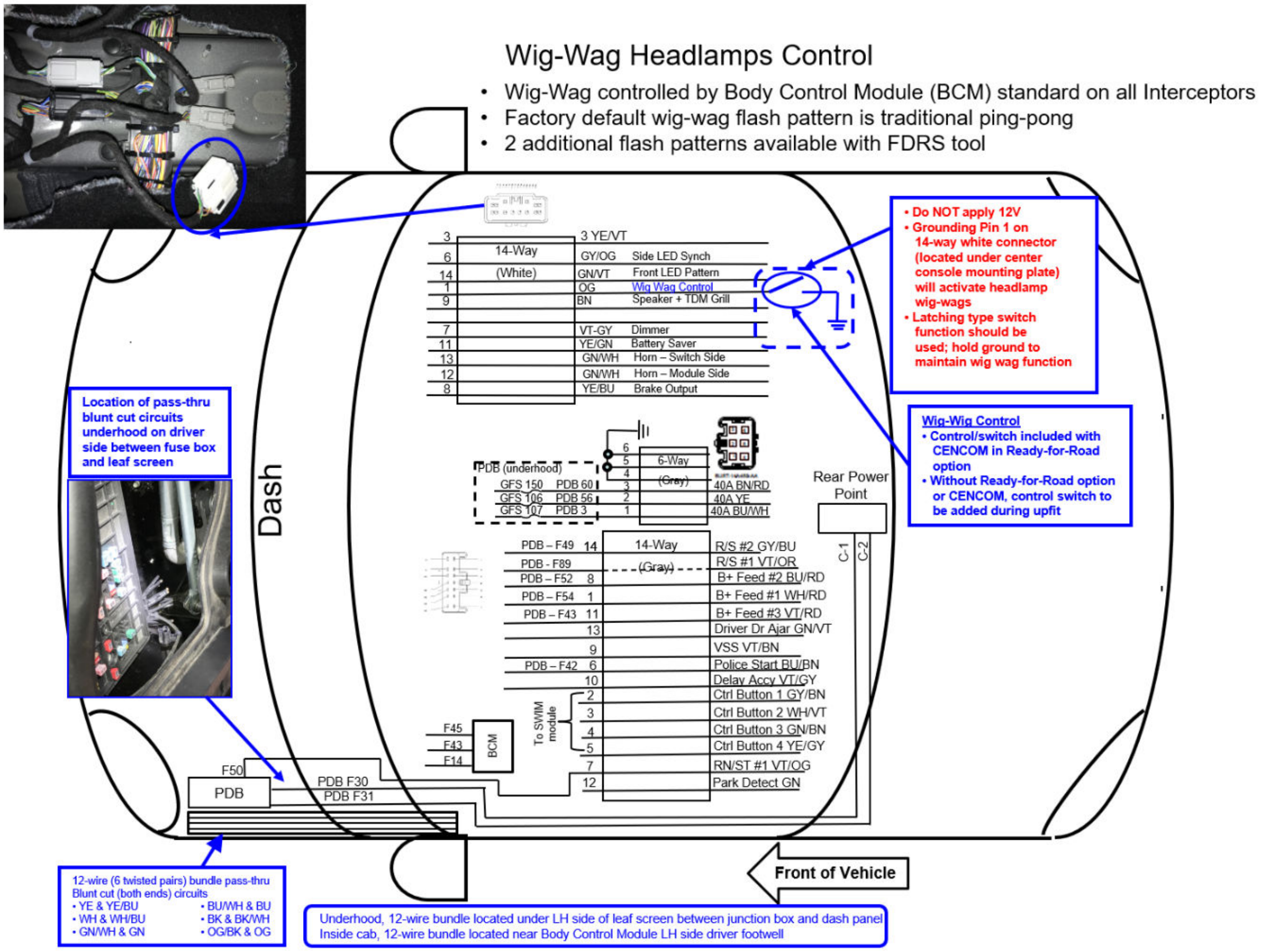
NOTE:
If gold terminals are being used, mating a gold terminal to gold terminal is best, silver to gold is acceptable. **DO NOT** use a tin terminal to a gold terminal.


Base Vehicle – No Wiring Options
14-Way (White)
3 YE/VT
6 GY/OG Side LED Synch
14 GN/VT Front LED Pattern
1 OG Wig Wag Control
9 BN Speaker + TDM Grill
7 VT-GY Dimmer
11 YE/GN Battery Saver
13 GN/WH Horn – Switch Side
12 GN/WH Horn – Module Side
8 YE/BU Brake Output
• Do NOT apply 12V to Pin 1 for Wig Wag control
• See schematic for Wig Wag Headlamps Control in this section of Modifier Guide
PDB (underhood)
GFS 150 PDB 60
GFS 106 PDB 56
GFS 107 PDB 3
6-Way (Gray)
6
5
4
3 40A BN/RD
2 40A YE
1 40A BU/WH
Rear Power Point
C-1
C-2
Dash
14-Way (Gray)
PDB – F49 14 R/S #2 GY/BU
PDB - F89 R/S #1 VT/OR
PDB – F52 8 B+ Feed #2 BU/RD
PDB – F54 1 B+ Feed #1 WH/RD
PDB – F43 11 B+ Feed #3 VT/RD
13 Driver Dr Ajar GN/VT
9 VSS VT/BN
PDB – F42 6 Police Start BU/BN
10 Delay Accy VT/GY
2 Ctrl Button 1 GY/BN
3 Ctrl Button 2 WH/VT
4 Ctrl Button 3 GN/BN
5 Ctrl Button 4 YE/GY
7 RN/ST #1 VT/OG
12 Park Detect GN
To SWIM module
BCM
F45
F43
F14
F50
PDB
PDB F30
PDB F31
Front of Vehicle
12-wire (6 twisted pairs) bundle pass-thru
Blunt cut (both ends) circuits
• YE & YE/BU
• WH & WH/BU
• GN/WH & GN
• BU/WH & BU
• BK & BK/WH
• OG/BK & OG
Underhood, 12-wire bundle located under LH side of leaf screen between junction box and dash panel
Inside cab, 12-wire bundle located near Body Control Module LH side driver footwell

N0184967

Section 5: Electrical

Wig-Wag Headlamps Control



Wig-Wag Headlamps Control

- Wig-Wag controlled by Body Control Module (BCM) standard on all Interceptors
- Factory default wig-wag flash pattern is traditional ping-pong
- 2 additional flash patterns available with FDRS tool

- Do NOT apply 12V
- Grounding Pin 1 on 14-way white connector (located under center console mounting plate) will activate headlamp wig-wags
- Latching type switch function should be used; hold ground to maintain wig wag function

Wig-Wig Control

- Control/switch included with CENCOM in Ready-for-Road option
- Without Ready-for-Road option or CENCOM, control switch to be added during upfit

Location of pass-thru blunt cut circuits underhood on driver side between fuse box and leaf screen

12-wire (6 twisted pairs) bundle pass-thru
Blunt cut (both ends) circuits

- YE & YE/BU
- WH & WH/BU
- GN/WH & GN
- BU/WH & BU
- BK & BK/WH
- OG/BK & OG

Underhood, 12-wire bundle located under LH side of leaf screen between junction box and dash panel
Inside cab, 12-wire bundle located near Body Control Module LH side driver footwell

Dash
14-Way
(White)
3 — 3 YE/VT
6 — GY/OG — Side LED Synch
14 — GN/VT — Front LED Pattern
1 — OG — Wig Wag Control
9 — BN — Speaker + TDM Grill
7 — VT-GY — Dimmer
11 — YE/GN — Battery Saver
13 — GN/WH — Horn – Switch Side
12 — GN/WH — Horn – Module Side
8 — YE/BU — Brake Output
PDB (underhood)
GFS 150 PDB 60
GFS 106 PDB 56
GFS 107 PDB 3
6-Way
(Gray)
6
5
4
3 — 40A BN/RD
2 — 40A YE
1 — 40A BU/WH
Rear Power Point
C-1
C-2
14-Way
(Gray)
PDB – F49 14 — R/S #2 GY/BU
PDB - F89 — R/S #1 VT/OR
PDB – F52 8 — B+ Feed #2 BU/RD
PDB – F54 1 — B+ Feed #1 WH/RD
PDB – F43 11 — B+ Feed #3 VT/RD
13 — Driver Dr Ajar GN/VT
9 — VSS VT/BN
PDB – F42 6 — Police Start BU/BN
10 — Delay Accy VT/GY
2 — Ctrl Button 1 GY/BN
3 — Ctrl Button 2 WH/VT
4 — Ctrl Button 3 GN/BN
5 — Ctrl Button 4 YE/GY
7 — RN/ST #1 VT/OG
12 — Park Detect GN
To SWIM module
BCM
F45
F43
F14
F50
PDB
PDB F30
PDB F31
Front of Vehicle

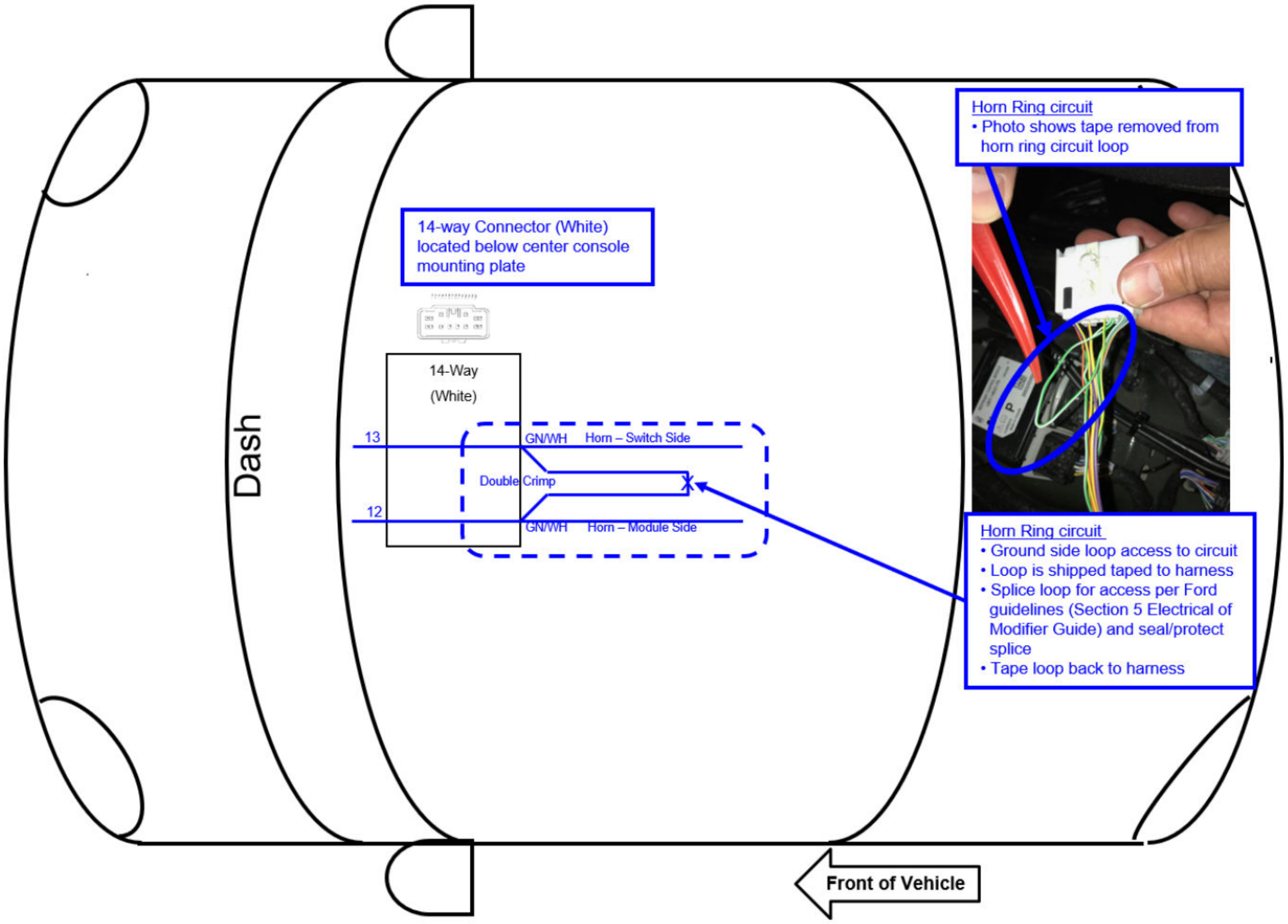
N0184968

Section 5: Electrical

Horn Ring Circuit

NOTE:
Harnesses **CANNOT** be taped to any fluid line. A sufficient clearance of 19 mm or greater should be maintained between harness and lines.

Horn Ring Circuit


Dash
14-Way
(White)
13
12
GN/WH Horn – Switch Side
Double Crimp
GN/WH Horn – Module Side
Front of Vehicle

14-way Connector (White) located below center console mounting plate

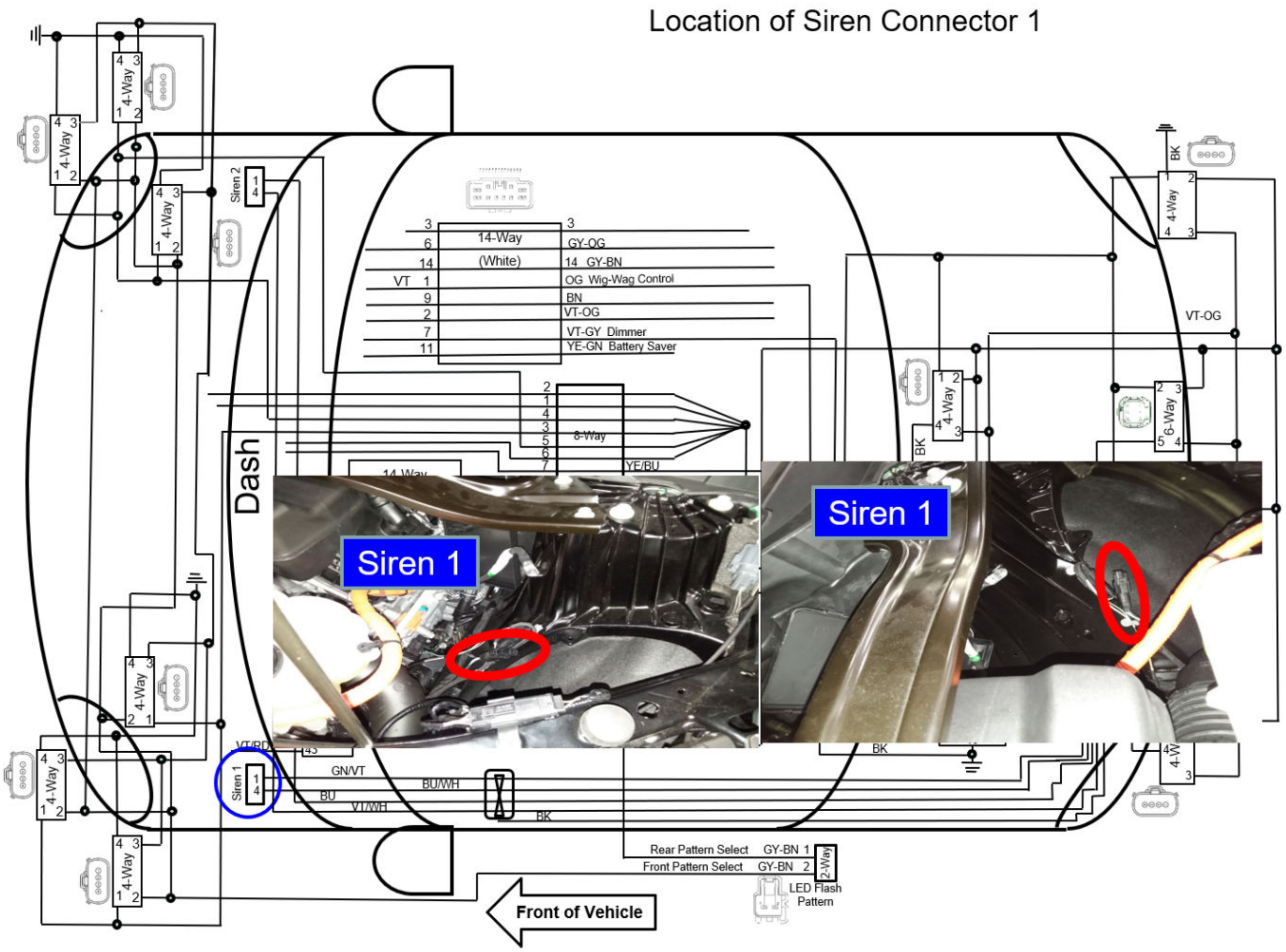
Horn Ring circuit
- Photo shows tape removed from horn ring circuit loop

Horn Ring circuit
- Ground side loop access to circuit
- Loop is shipped taped to harness
- Splice loop for access per Ford guidelines (Section 5 Electrical of Modifier Guide) and seal/protect splice
- Tape loop back to harness

N0184971

Section 5: Electrical

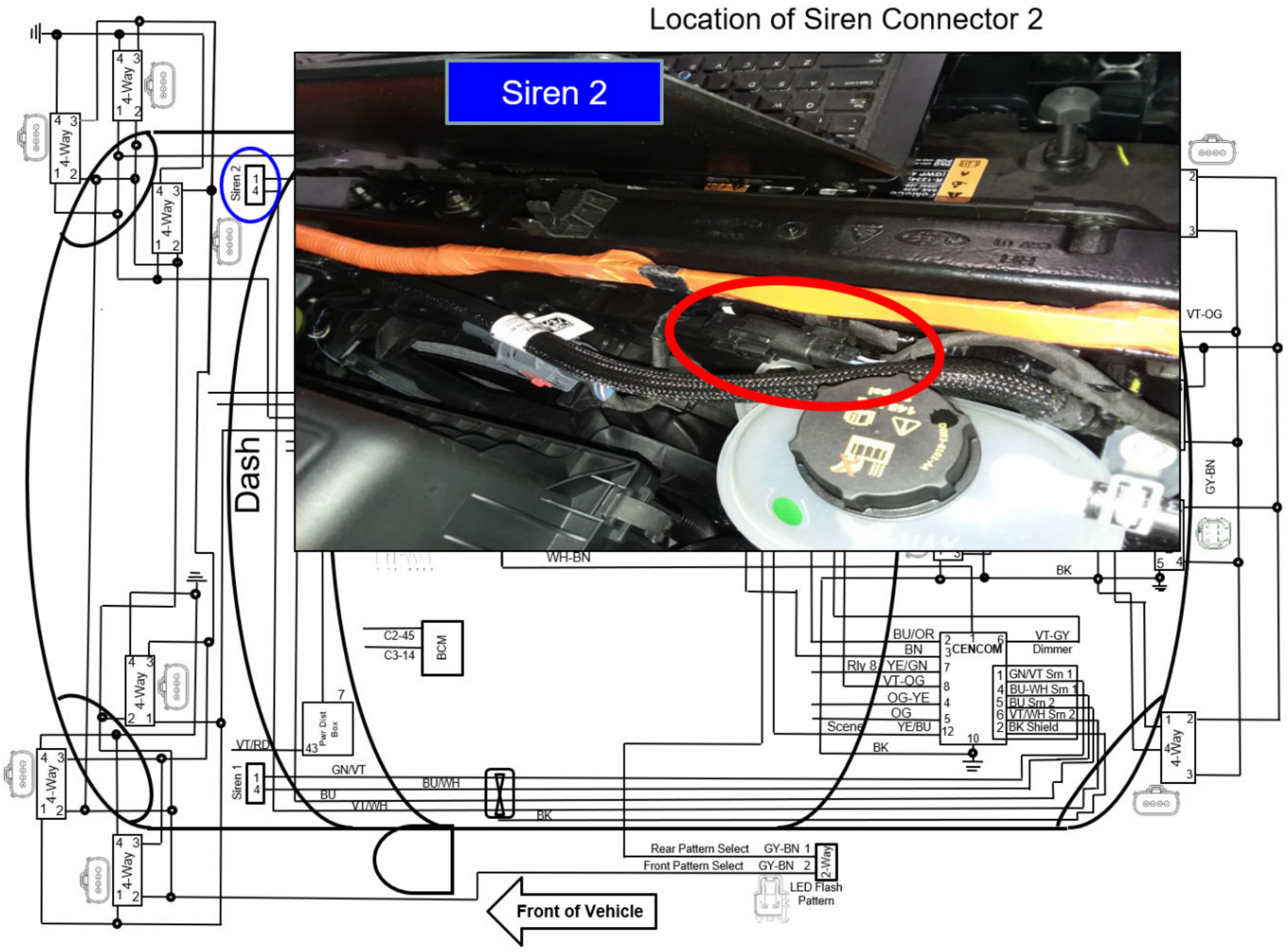
Location of siren connector 1


Location of Siren Connector 1
Siren 2
Siren 1
Siren 1
Siren 1
4-Way
6-Way
8-Way
14-Way
(White)
2-Way
Dash
3 GY-OG
6
14 GY-BN
VT 1 OG Wig-Wag Control
9 BN
2 VT-OG
7 VT-GY Dimmer
11 YE-GN Battery Saver
YE/BU
VT-OG
BK
VT/RD
GN/VT
BU
BU/WH
VT/WH
Rear Pattern Select GY-BN 1
Front Pattern Select GY-BN 2
LED Flash Pattern
Front of Vehicle

N0184972

Section 5: Electrical

Location of siren connector 2

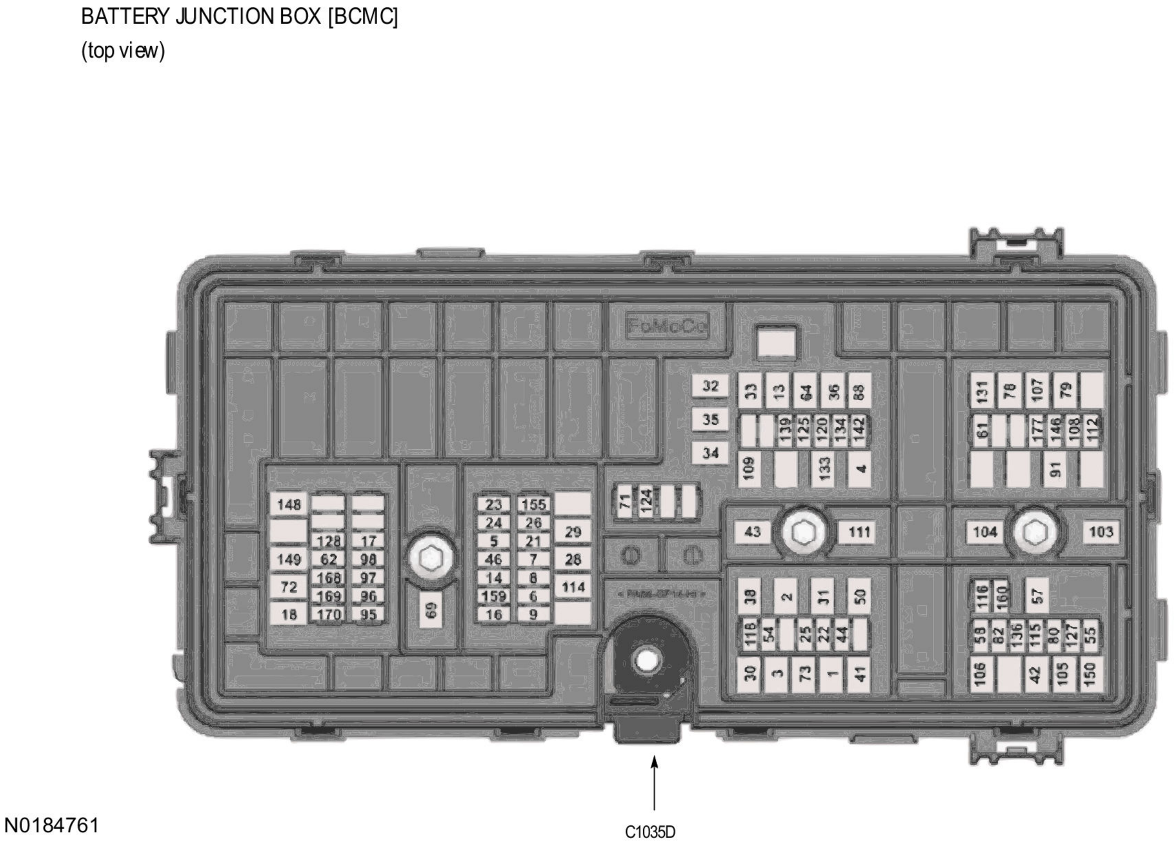

Location of Siren Connector 2
Siren 2
4-Way
Siren 2
Dash
Siren 1
GN/VT
BU/WH
BU
VT/WH
BK
VT/RD
43
Pwr Dist Box
7
C2-45
C3-14
BCM
WH-BN
BU/OR
BN
Rly 8
YE/GN
VT-OG
OG-YE
OG
Scene
YE/BU
CENCOM
VT-GY
Dimmer
GN/VT Sm 1
BU-WH Sm 1
BU Sm 2
VT/WH Sm 2
BK Shield
VT-OG
GY-BN
Rear Pattern Select
Front Pattern Select
GY-BN
2-Way
LED Flash Pattern
Front of Vehicle

N0184973

Section 5: Electrical

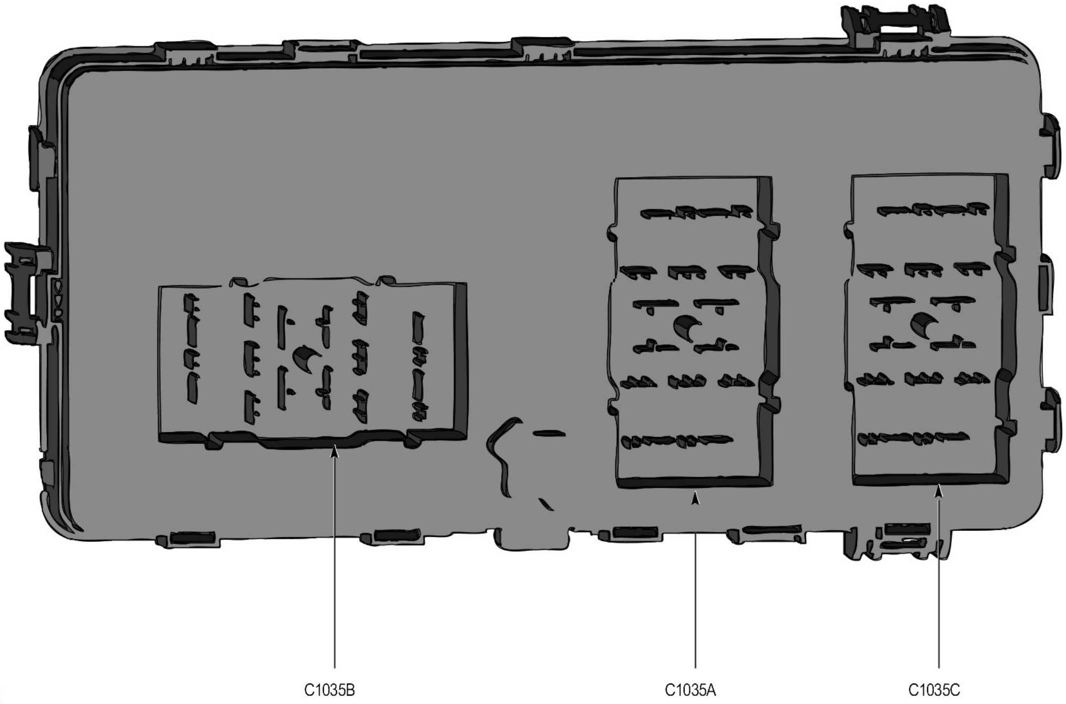
Wire Diagram

Battery Junction Box (BJB)


BATTERY JUNCTION BOX [BCMC]
(top view)
FoMoCo
32
35
34
33
13
64
36
88
139
125
120
134
142
109
133
4
131
78
107
79
61
177
146
108
112
91
148
128
17
149
62
98
72
168
97
169
96
18
170
95
69
23
155
24
26
5
21
29
46
7
28
14
8
114
159
6
16
9
71
124
43
111
104
103
38
2
31
50
118
54
25
22
44
30
3
73
1
41
116
160
57
58
82
136
115
80
127
55
106
42
105
150
N0184761
C1035D

Section 5: Electrical

BATTERY JUNCTION BOX [BCMC]
(bottom view)

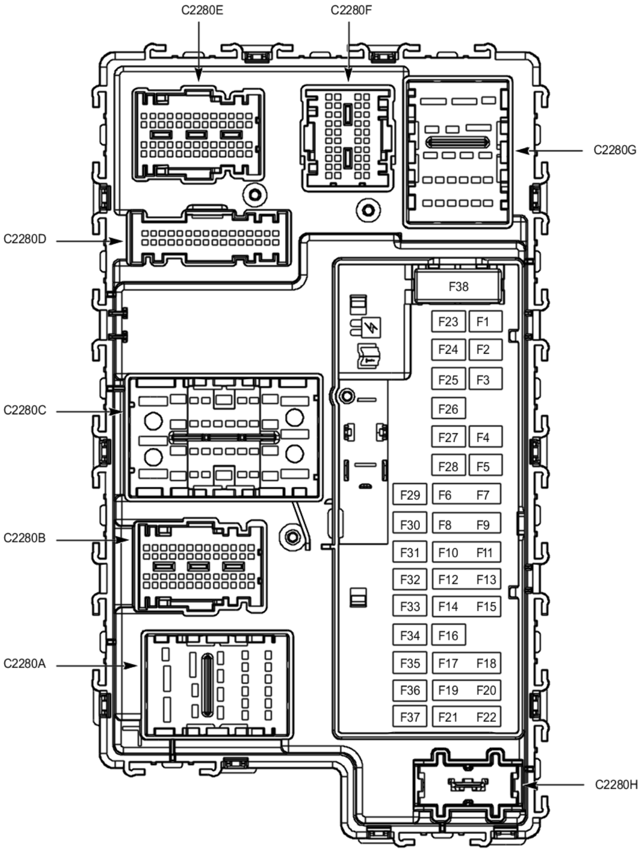

C1035B
C1035A
C1035C

N0184762

Section 5: Electrical

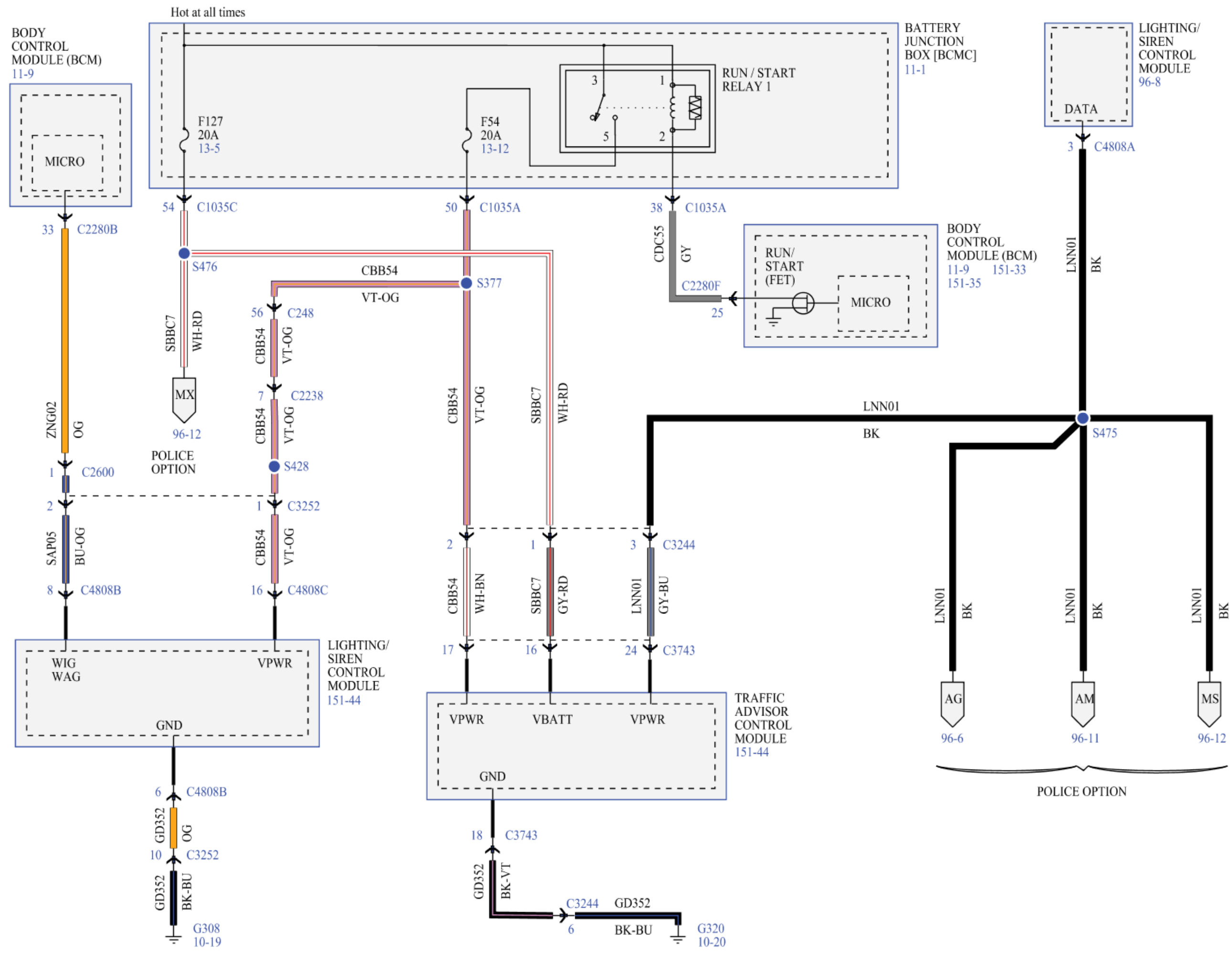
Body Control Module (BCM)

BODY CONTROL MODULE (BCM)


C2280E
C2280F
C2280G
C2280D
C2280C
C2280B
C2280A
C2280H
F38
F23
F1
F24
F2
F25
F3
F26
F27
F4
F28
F5
F29
F6
F7
F30
F8
F9
F31
F10
F11
F32
F12
F13
F33
F14
F15
F34
F16
F35
F17
F18
F36
F19
F20
F37
F21
F22

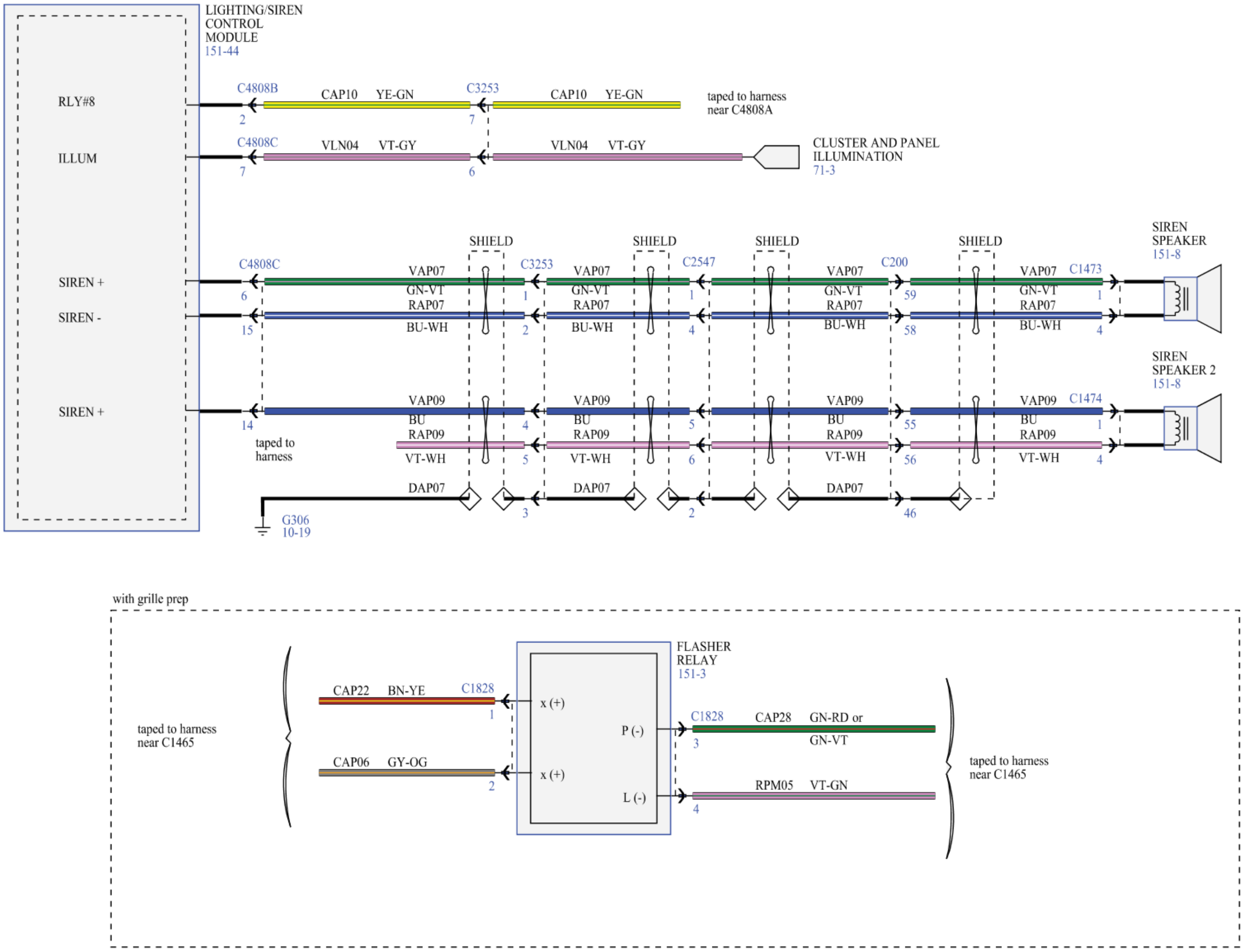
N0180419

Section 5: Electrical


Hot at all times
BODY CONTROL MODULE (BCM)
11-9
MICRO
33 C2280B
ZNG02 OG
1 C2600
2
SAP05 BU-OG
8 C4808B
LIGHTING/ SIREN CONTROL MODULE
151-44
WIG WAG
VPWR
GND
6 C4808B
GD352 OG
10 C3252
GD352 BK-BU
G308
10-19
BATTERY JUNCTION BOX [BCMC]
11-1
F127 20A 13-5
F54 20A 13-12
3 1 5 2
RUN / START RELAY 1
54 C1035C
S476
SBBC7 WH-RD
MX
96-12
POLICE OPTION
CBB54
VT-OG
S377
56 C248
CBB54 VT-OG
7 C2238
CBB54 VT-OG
S428
1 C3252
CBB54 VT-OG
16 C4808C
50 C1035A
CBB54 VT-OG
SBBC7 WH-RD
38 C1035A
CDC55 GY
C2280F
25
BODY CONTROL MODULE (BCM)
11-9 151-33
151-35
RUN/ START (FET)
MICRO
2 1 3 C3244
CBB54 WH-BN
SBBC7 GY-RD
LNN01 GY-BU
17 16 24 C3743
TRAFFIC ADVISOR CONTROL MODULE
151-44
VPWR VBATT VPWR
GND
18 C3743
GD352 BK-VT
C3244 GD352
6 BK-BU
G320
10-20
LIGHTING/ SIREN CONTROL MODULE
96-8
DATA
3 C4808A
LNN01 BK
LNN01
BK
S475
LNN01 BK
LNN01 BK
LNN01 BK
AG
96-6
AM
96-11
MS
96-12
POLICE OPTION

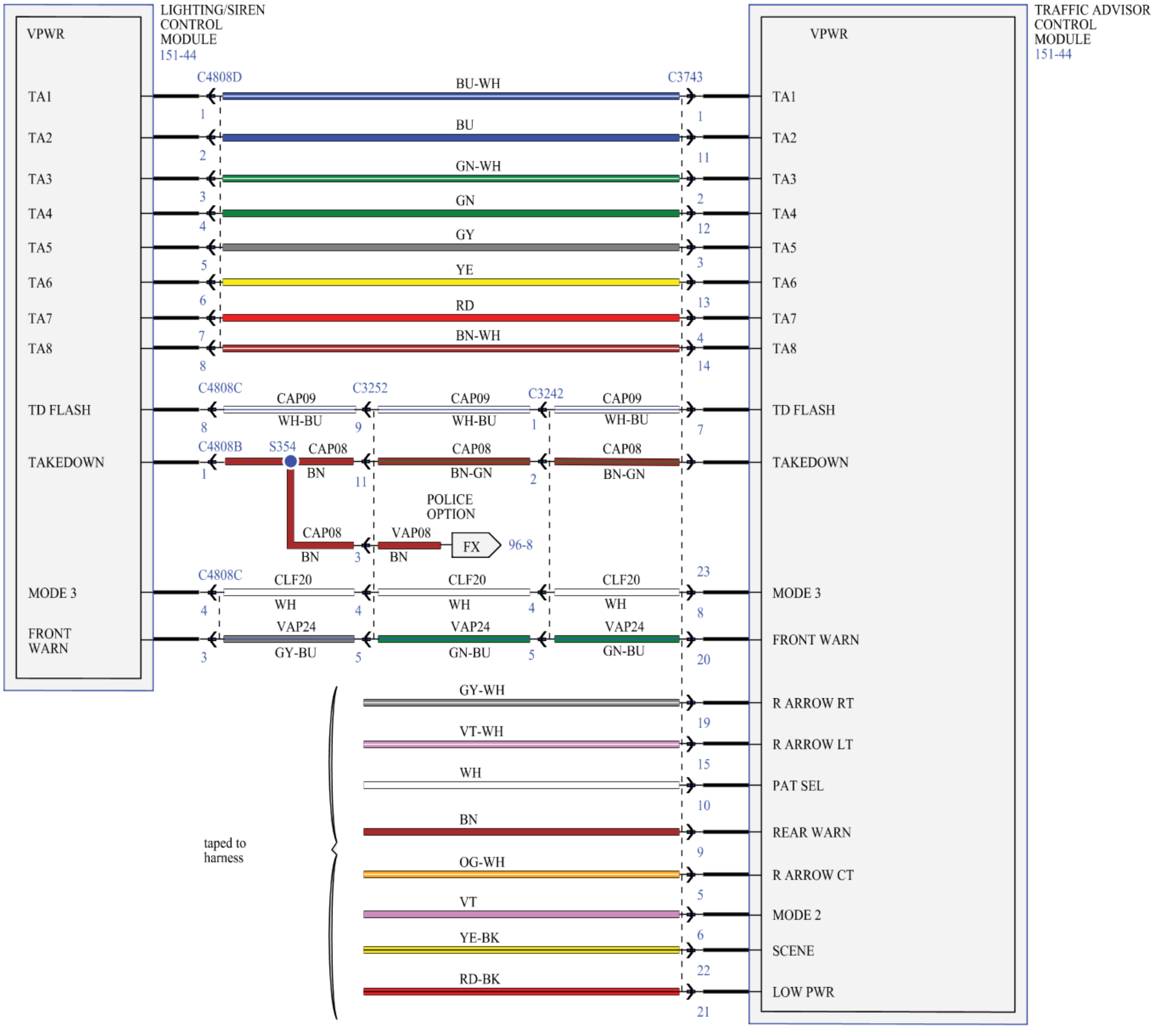
N0183967

Section 5: Electrical


LIGHTING/SIREN
CONTROL
MODULE
151-44
RLY#8
ILLUM
SIREN +
SIREN -
SIREN +
C4808B
2
CAP10 YE-GN
C3253
7
CAP10 YE-GN
taped to harness
near C4808A
C4808C
7
VLN04 VT-GY
6
VLN04 VT-GY
CLUSTER AND PANEL
ILLUMINATION
71-3
SHIELD
SHIELD
SHIELD
SHIELD
C4808C
6
15
VAP07
GN-VT
RAP07
BU-WH
C3253
1
2
C2547
1
4
C200
59
58
C1473
1
4
SIREN
SPEAKER
151-8
VAP09
BU
RAP09
VT-WH
14
taped to
harness
4
5
5
6
55
56
C1474
1
4
SIREN
SPEAKER 2
151-8
DAP07
3
2
46
G306
10-19
with grille prep
taped to harness
near C1465
CAP22 BN-YE
C1828
1
CAP06 GY-OG
2
FLASHER
RELAY
151-3
x (+)
x (+)
P (-)
L (-)
C1828
3
CAP28 GN-RD or
GN-VT
RPM05 VT-GN
4
taped to harness
near C1465

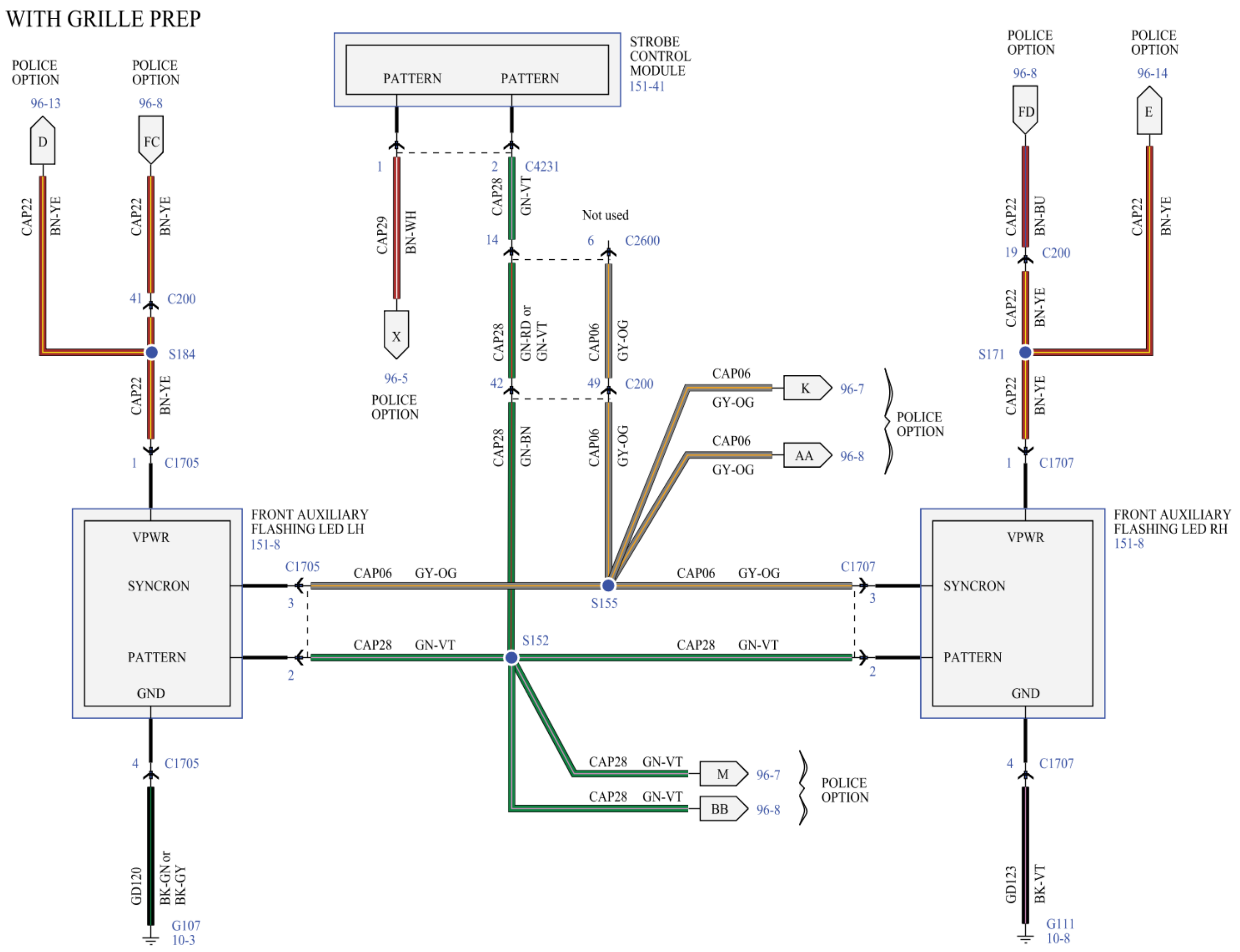
N0183968

Section 5: Electrical


LIGHTING/SIREN CONTROL MODULE
151-44
VPWR
TA1
TA2
TA3
TA4
TA5
TA6
TA7
TA8
TD FLASH
TAKEDOWN
MODE 3
FRONT WARN
C4808D
C4808C
C4808B
S354
C3252
C3242
C3743
BU-WH
BU
GN-WH
GN
GY
YE
RD
BN-WH
CAP09
WH-BU
CAP08
BN
BN-GN
POLICE OPTION
VAP08
FX
96-8
CLF20
WH
VAP24
GY-BU
GN-BU
GY-WH
VT-WH
BN
OG-WH
VT
YE-BK
RD-BK
taped to harness
TRAFFIC ADVISOR CONTROL MODULE
151-44
R ARROW RT
R ARROW LT
PAT SEL
REAR WARN
R ARROW CT
MODE 2
SCENE
LOW PWR

N0183969

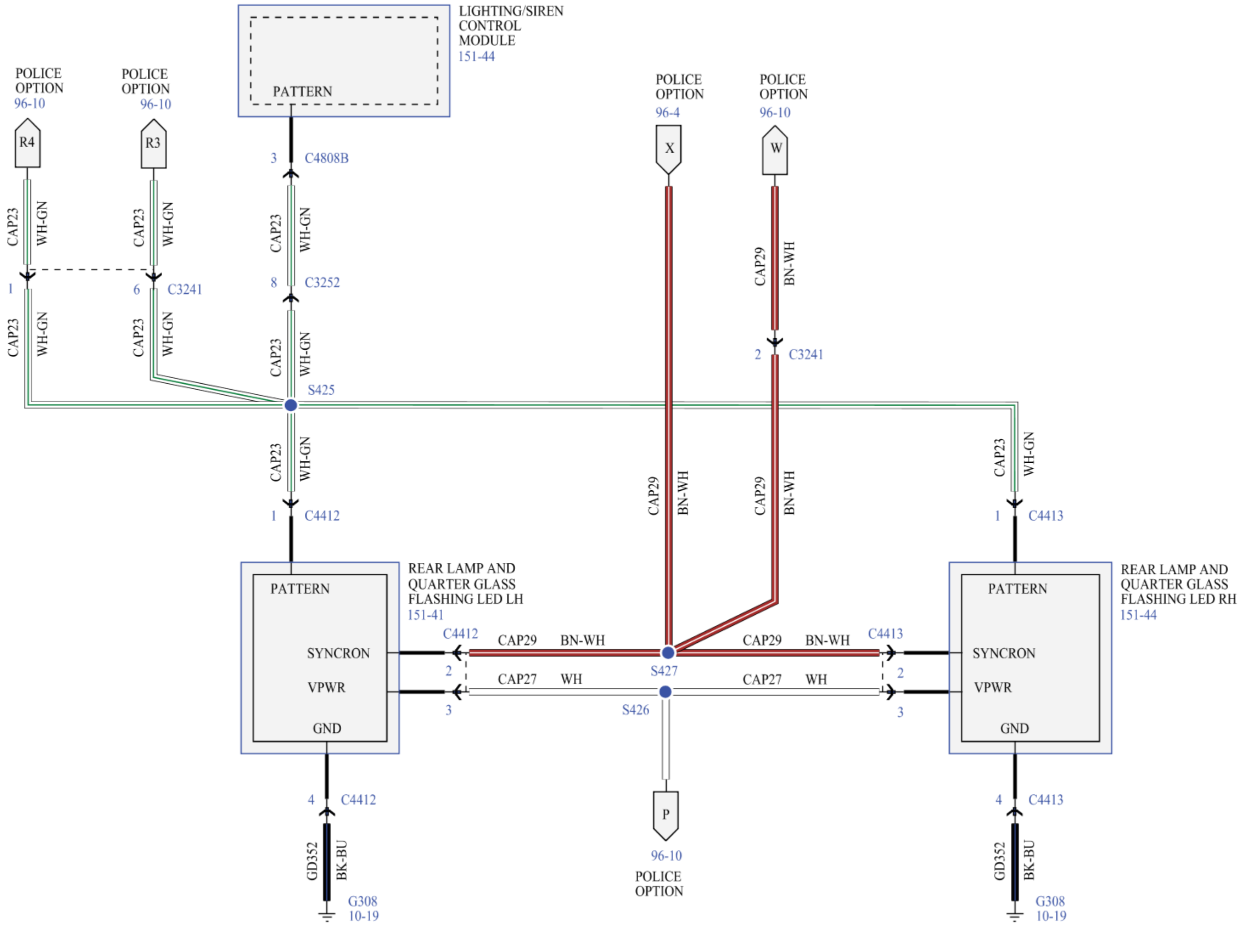
Section 5: Electrical


WITH GRILLE PREP
POLICE OPTION
96-13
D
CAP22 BN-YE
POLICE OPTION
96-8
FC
CAP22 BN-YE
41 C200
S184
CAP22 BN-YE
1 C1705
FRONT AUXILIARY FLASHING LED LH
151-8
VPWR
SYNCRON
PATTERN
GND
C1705
3
2
4 C1705
GD120 BK-GN or BK-GY
G107 10-3
STROBE CONTROL MODULE
151-41
PATTERN
PATTERN
1
CAP29 BN-WH
X
96-5
POLICE OPTION
2 C4231
CAP28 GN-VT
14
CAP28 GN-RD or GN-VT
42
CAP28 GN-BN
Not used
6 C2600
CAP06 GY-OG
49 C200
CAP06 GY-OG
CAP06 GY-OG
K 96-7
CAP06 GY-OG
AA 96-8
POLICE OPTION
CAP06 GY-OG
S155
CAP06 GY-OG
C1707
3
CAP28 GN-VT
S152
CAP28 GN-VT
2
CAP28 GN-VT
M 96-7
CAP28 GN-VT
BB 96-8
POLICE OPTION
POLICE OPTION
96-8
FD
CAP22 BN-BU
19 C200
CAP22 BN-YE
S171
CAP22 BN-YE
1 C1707
POLICE OPTION
96-14
E
CAP22 BN-YE
FRONT AUXILIARY FLASHING LED RH
151-8
VPWR
SYNCRON
PATTERN
GND
4 C1707
GD123 BK-VT
G111 10-8

N0183970

Section 5: Electrical

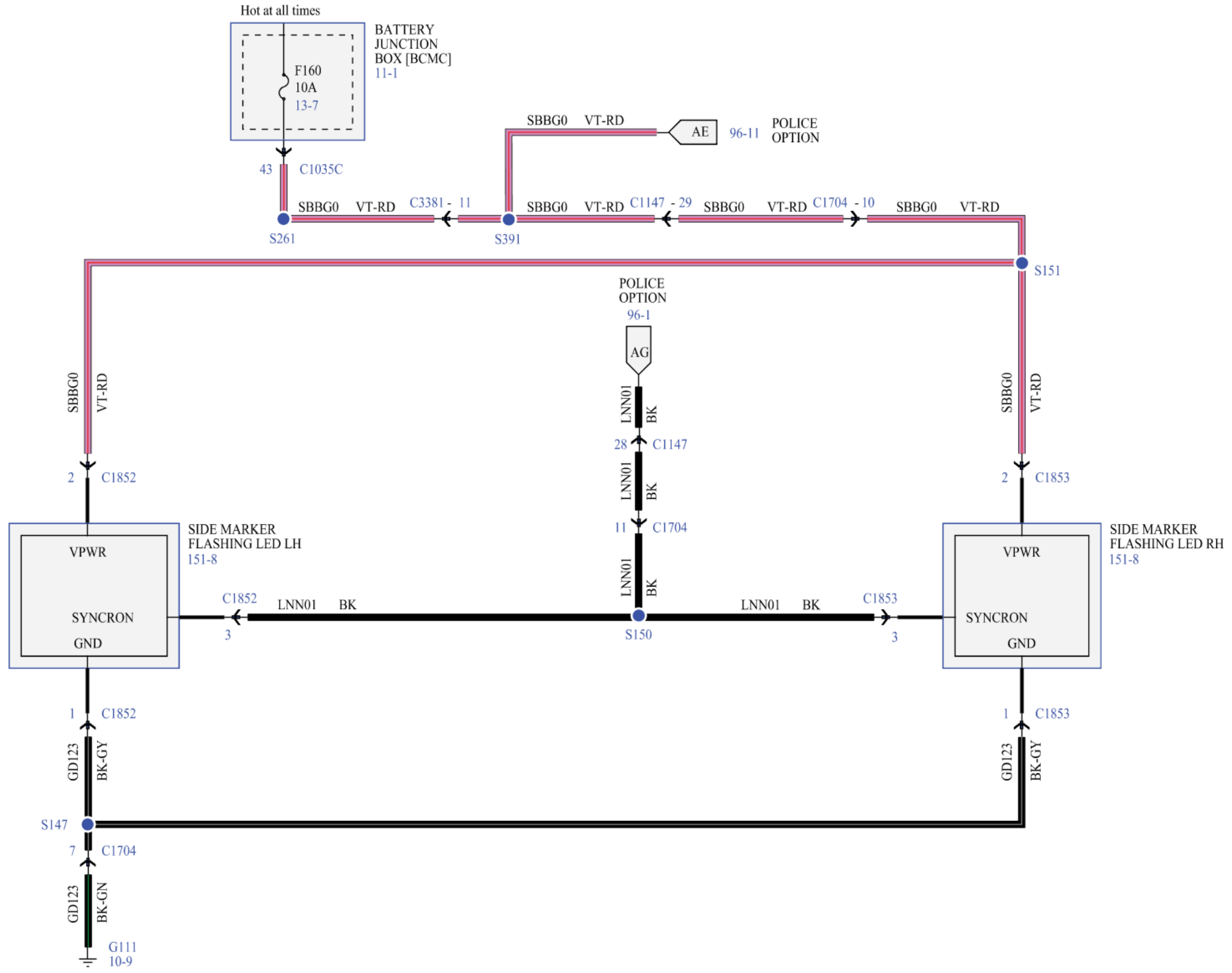
WITH GRILLE PREP


LIGHTING/SIREN CONTROL MODULE
151-44
PATTERN
POLICE OPTION
96-10
R4
POLICE OPTION
96-10
R3
POLICE OPTION
96-4
X
POLICE OPTION
96-10
W
3 C4808B
CAP23 WH-GN
8 C3252
1
6 C3241
CAP29 BN-WH
2 C3241
S425
1 C4412
1 C4413
REAR LAMP AND QUARTER GLASS FLASHING LED LH
151-41
REAR LAMP AND QUARTER GLASS FLASHING LED RH
151-44
PATTERN
SYNCRON
VPWR
GND
C4412
C4413
CAP29 BN-WH
CAP27 WH
S427
S426
2
3
4 C4412
4 C4413
GD352 BK-BU
G308
10-19
P
96-10
POLICE OPTION

N0183971

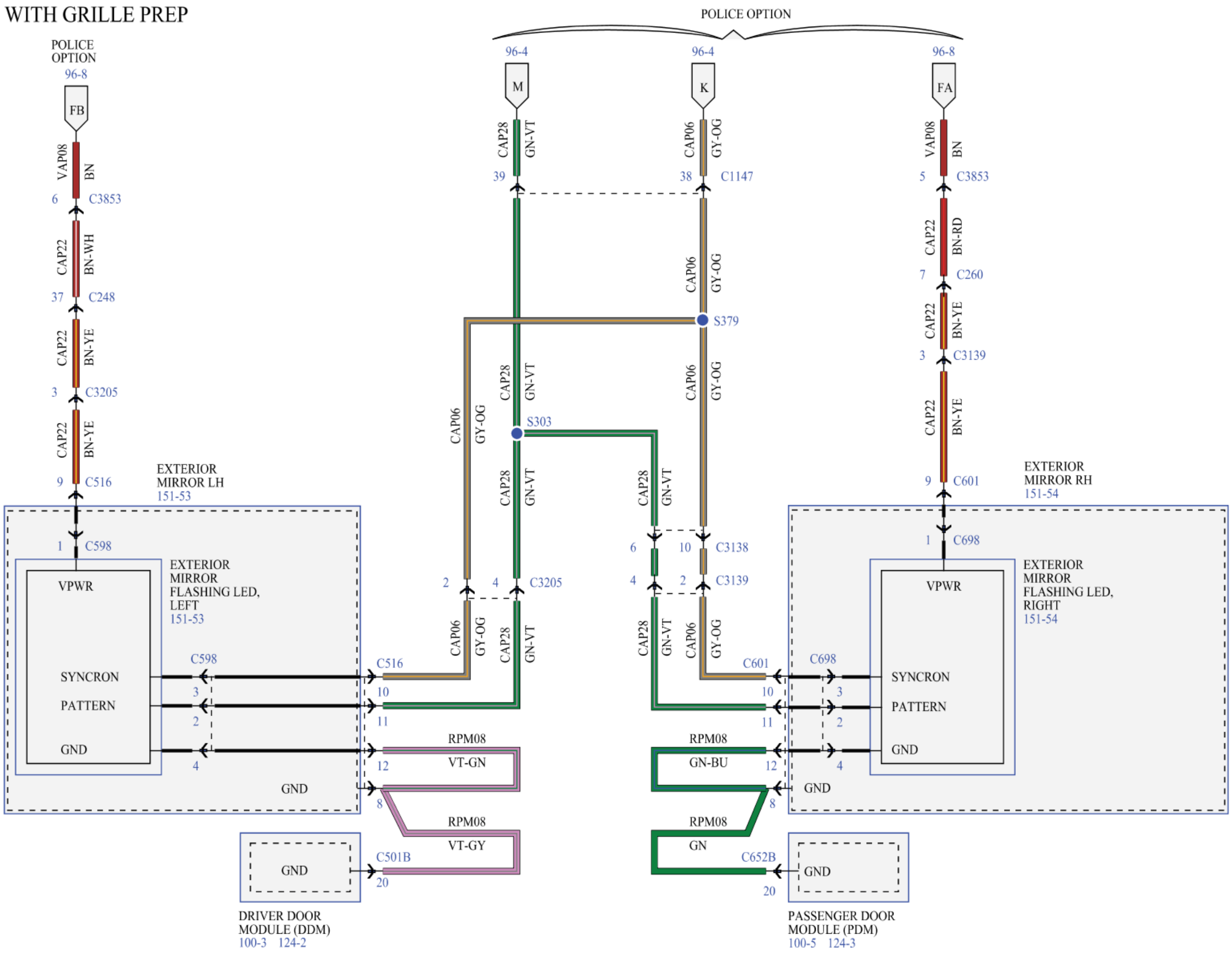
Section 5: Electrical

WITH GRILLE PREP


Hot at all times
BATTERY JUNCTION BOX [BCMC]
11-1
F160
10A
13-7
43
C1035C
S261
SBBG0 VT-RD
C3381 - 11
S391
SBBG0 VT-RD
AE
96-11
POLICE OPTION
SBBG0 VT-RD
C1147 - 29
SBBG0 VT-RD
C1704 - 10
SBBG0 VT-RD
S151
SBBG0 VT-RD
SBBG0 VT-RD
POLICE OPTION
96-1
AG
LNN01 BK
28 C1147
LNN01 BK
11 C1704
LNN01 BK
2 C1852
2 C1853
VPWR
SYNCRON
GND
SIDE MARKER FLASHING LED LH
151-8
C1852
3
LNN01 BK
S150
LNN01 BK
C1853
3
VPWR
SYNCRON
GND
SIDE MARKER FLASHING LED RH
151-8
1 C1852
GD123 BK-GY
1 C1853
GD123 BK-GY
S147
7 C1704
GD123 BK-GN
G111
10-9

N0183972

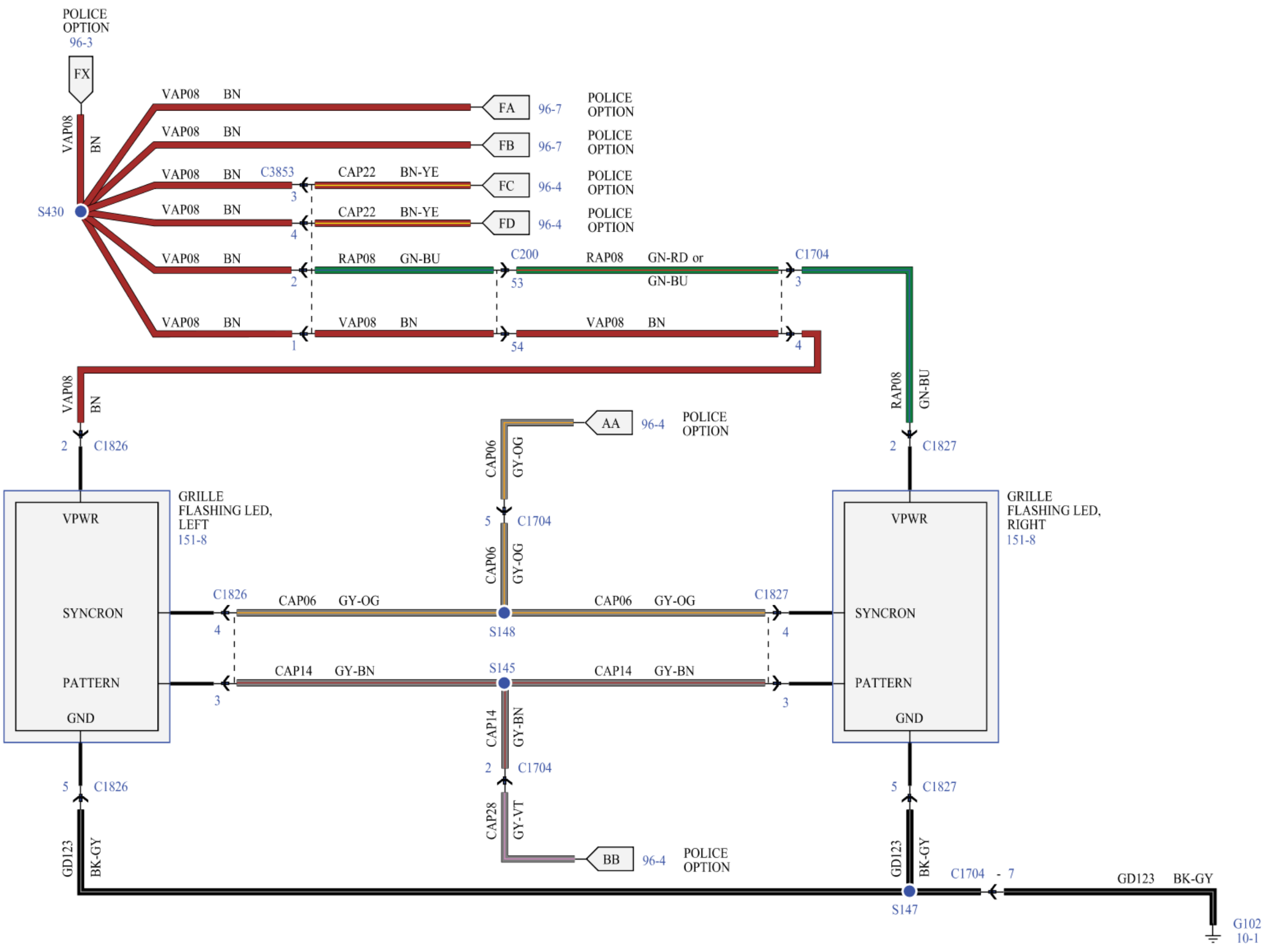
Section 5: Electrical


WITH GRILLE PREP
POLICE OPTION
96-8
FB
VAP08
BN
6
C3853
CAP22
BN-WH
37
C248
CAP22
BN-YE
3
C3205
CAP22
BN-YE
9
C516
EXTERIOR MIRROR LH
151-53
1
C598
VPWR
EXTERIOR MIRROR FLASHING LED, LEFT
151-53
SYNCRON
PATTERN
GND
C598
3
2
4
GND
C516
10
11
12
8
RPM08
VT-GN
RPM08
VT-GY
GND
C501B
20
DRIVER DOOR MODULE (DDM)
100-3 124-2
POLICE OPTION
96-4
M
CAP28
GN-VT
39
96-4
K
CAP06
GY-OG
38
C1147
CAP06
GY-OG
S379
CAP28
GN-VT
CAP06
GY-OG
S303
CAP06
GY-OG
CAP28
GN-VT
CAP28
GN-VT
2
4
C3205
CAP06
GY-OG
CAP28
GN-VT
6
10
C3138
4
2
C3139
CAP28
GN-VT
CAP06
GY-OG
96-8
FA
VAP08
BN
5
C3853
CAP22
BN-RD
7
C260
CAP22
BN-YE
3
C3139
CAP22
BN-YE
9
C601
EXTERIOR MIRROR RH
151-54
1
C698
VPWR
EXTERIOR MIRROR FLASHING LED, RIGHT
151-54
C601
C698
SYNCRON
PATTERN
GND
10
3
11
2
12
4
8
GND
RPM08
GN-BU
RPM08
GN
C652B
20
GND
PASSENGER DOOR MODULE (PDM)
100-5 124-3

N0183975

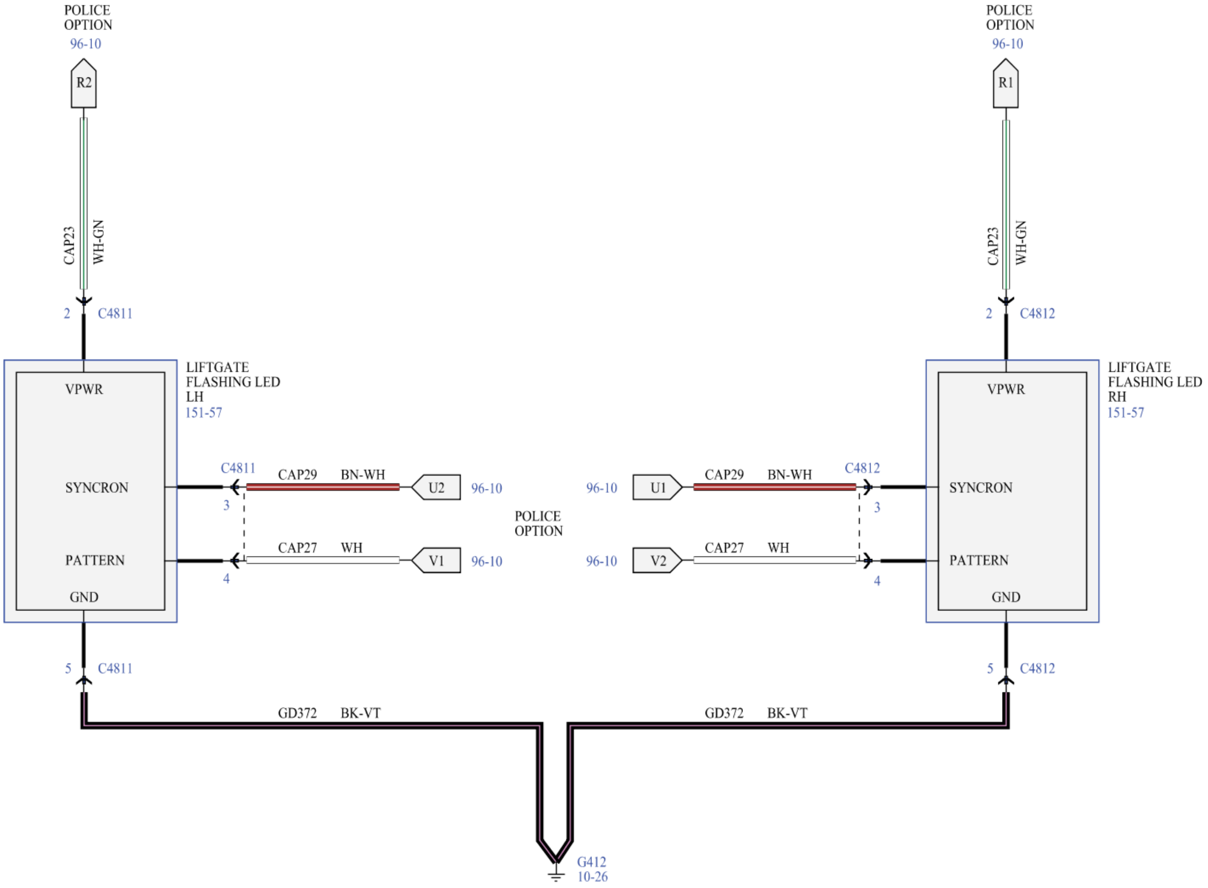
Section 5: Electrical

WITH GRILLE PREP


POLICE OPTION
96-3
FX
VAP08 BN
FA 96-7 POLICE OPTION
FB 96-7 POLICE OPTION
C3853
CAP22 BN-YE
FC 96-4 POLICE OPTION
FD 96-4 POLICE OPTION
S430
3
4
2
1
RAP08 GN-BU
C200
53
54
RAP08 GN-RD or GN-BU
C1704
VAP08 BN
RAP08 GN-BU
2 C1826
2 C1827
AA 96-4 POLICE OPTION
CAP06 GY-OG
5 C1704
GRILLE FLASHING LED, LEFT
151-8
GRILLE FLASHING LED, RIGHT
151-8
VPWR
SYNCRON
PATTERN
GND
C1826
C1827
CAP06 GY-OG
S148
CAP14 GY-BN
S145
CAP14 GY-BN
2 C1704
CAP28 GY-VT
BB 96-4 POLICE OPTION
5 C1826
5 C1827
GD123 BK-GY
S147
C1704 - 7
G102
10-1

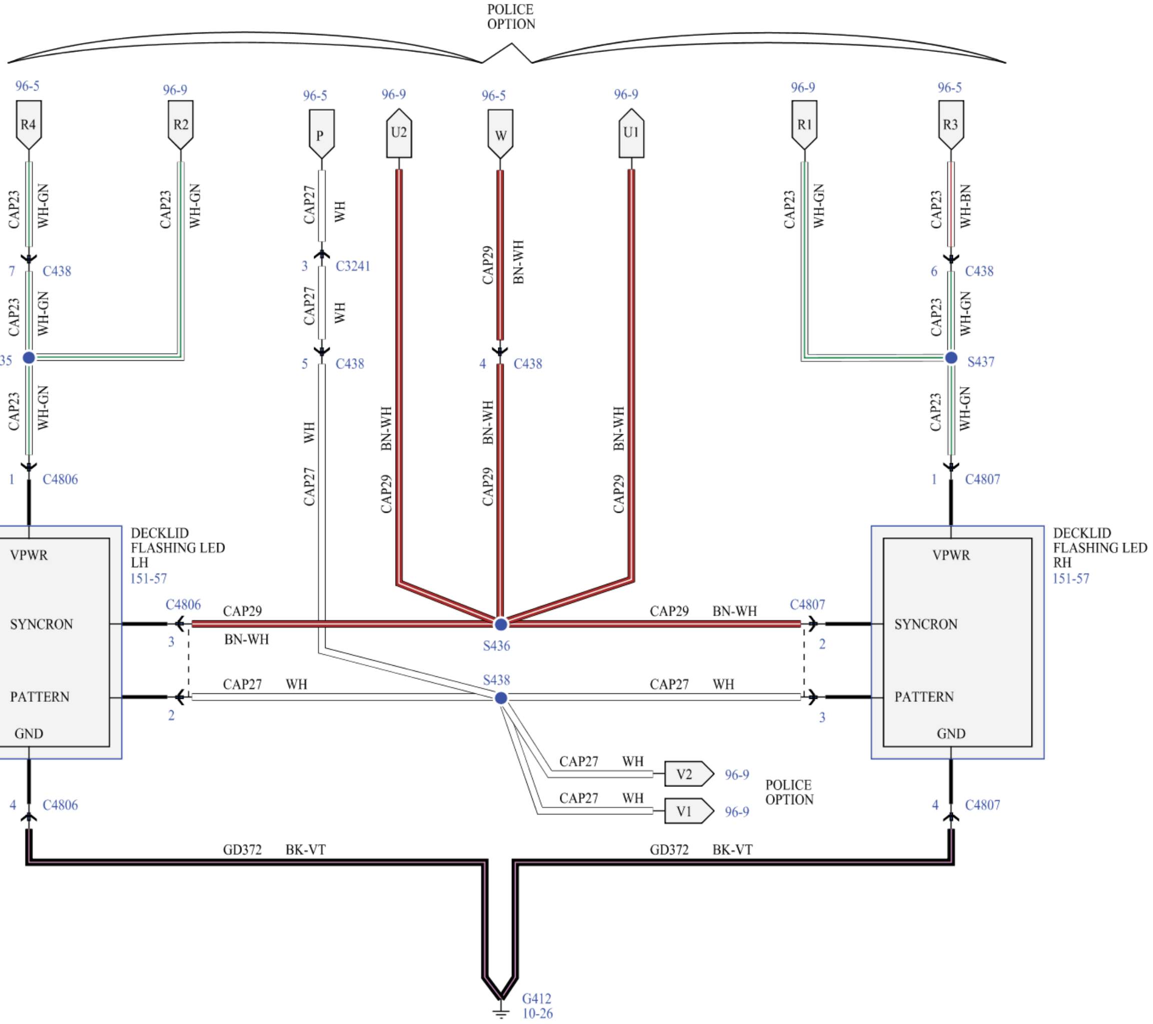
N0183976

Section 5: Electrical


POLICE OPTION
96-10
R2
CAP23
WH-GN
2
C4811
POLICE OPTION
96-10
R1
CAP23
WH-GN
2
C4812
VPWR
SYNCRON
PATTERN
GND
LIFTGATE FLASHING LED LH
151-57
LIFTGATE FLASHING LED RH
151-57
C4811
3
CAP29
BN-WH
U2
96-10
4
CAP27
WH
V1
96-10
POLICE OPTION
96-10
U1
CAP29
BN-WH
C4812
3
96-10
V2
CAP27
WH
4
5
C4811
5
C4812
GD372
BK-VT
GD372
BK-VT
G412
10-26

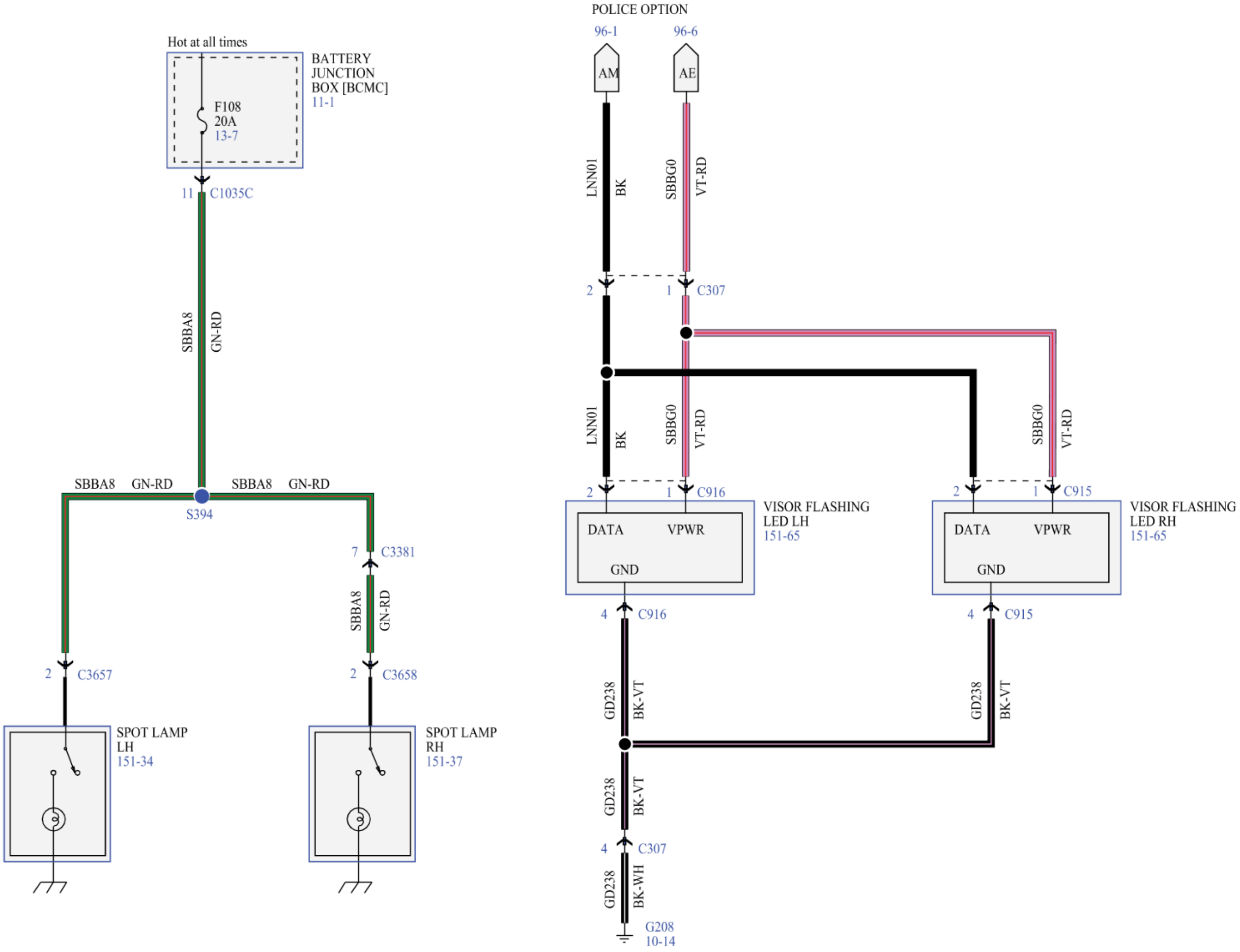
N0183977

Section 5: Electrical


POLICE OPTION
96-5
R4
96-9
R2
96-5
P
96-9
U2
96-5
W
96-9
U1
96-9
R1
96-5
R3
CAP23 WH-GN
CAP23 WH-GN
CAP27 WH
CAP29 BN-WH
CAP23 WH-GN
CAP23 WH-BN
7 C438
3 C3241
6 C438
CAP23 WH-GN
CAP27 WH
CAP23 WH-GN
S435
5 C438
4 C438
S437
CAP23 WH-GN
CAP27 WH
CAP29 BN-WH
CAP29 BN-WH
CAP29 BN-WH
CAP23 WH-GN
1 C4806
1 C4807
VPWR
SYNCRON
PATTERN
GND
DECKLID FLASHING LED LH
151-57
C4806
CAP29
BN-WH
3
S436
CAP29 BN-WH
C4807
2
VPWR
SYNCRON
PATTERN
GND
DECKLID FLASHING LED RH
151-57
CAP27 WH
2
S438
CAP27 WH
3
CAP27 WH
V2
96-9
CAP27 WH
V1
96-9
POLICE OPTION
4 C4806
4 C4807
GD372 BK-VT
GD372 BK-VT
G412
10-26

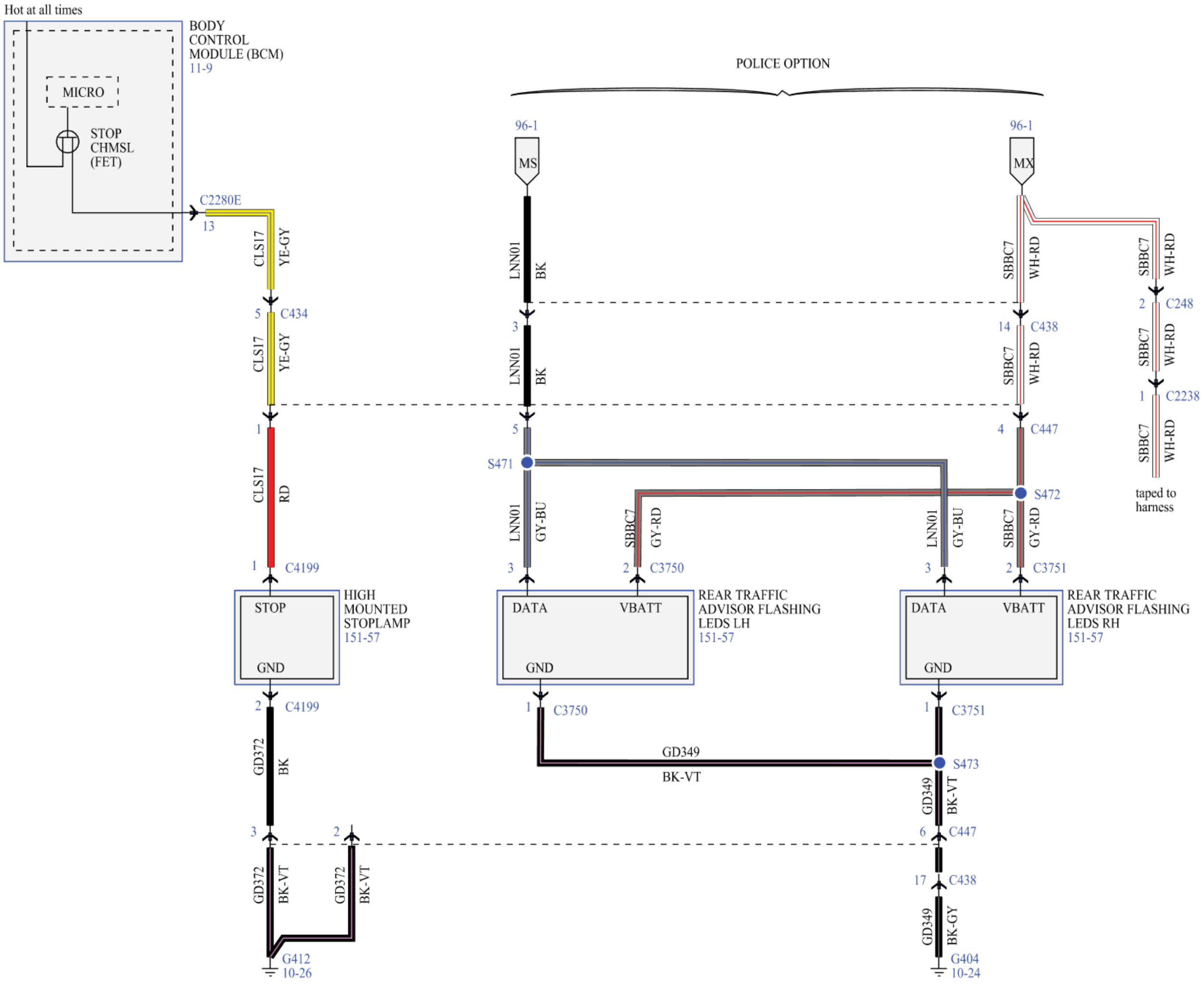
N0183978

Section 5: Electrical


Hot at all times
BATTERY JUNCTION BOX [BCMC]
11-1
F108
20A
13-7
11
C1035C
SBBA8
GN-RD
SBBA8 GN-RD
SBBA8 GN-RD
S394
7
C3381
SBBA8
GN-RD
2
C3657
2
C3658
SPOT LAMP LH
151-34
SPOT LAMP RH
151-37
POLICE OPTION
96-1
96-6
AM
AE
LNN01
BK
SBBG0
VT-RD
2
1
C307
LNN01
BK
SBBG0
VT-RD
SBBG0
VT-RD
2
1
C916
2
1
C915
DATA
VPWR
GND
VISOR FLASHING LED LH
151-65
DATA
VPWR
GND
VISOR FLASHING LED RH
151-65
4
C916
4
C915
GD238
BK-VT
GD238
BK-VT
GD238
BK-VT
4
C307
GD238
BK-WH
G208
10-14

N0183979

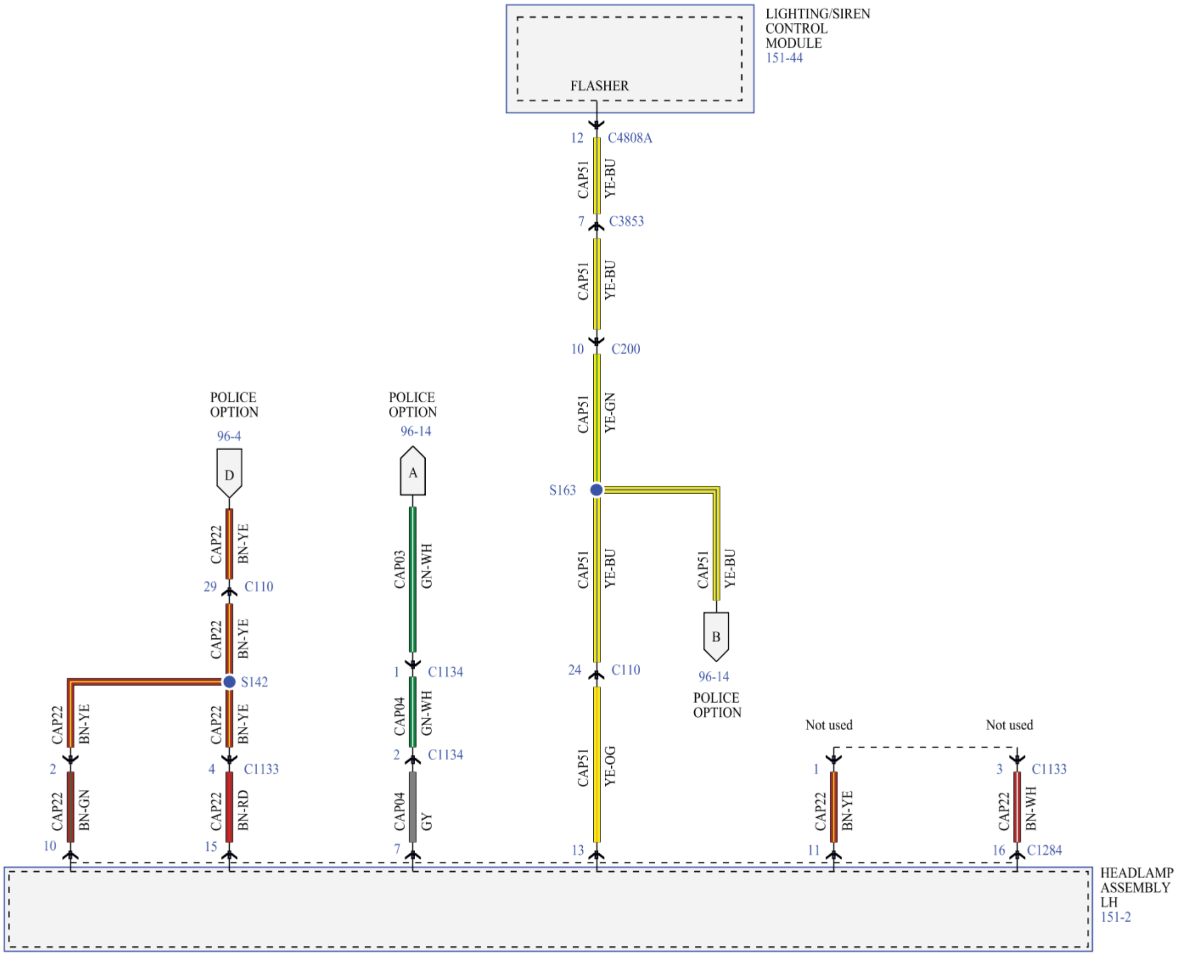
Section 5: Electrical


Hot at all times
BODY CONTROL MODULE (BCM)
11-9
MICRO
STOP CHMSL (FET)
C2280E
13
CLS17
YE-GY
5
C434
CLS17
YE-GY
1
CLS17
RD
1
C4199
STOP
HIGH MOUNTED STOPLAMP
151-57
GND
2
C4199
GD372
BK
3
2
GD372
BK-VT
GD372
BK-VT
G412
10-26
POLICE OPTION
96-1
MS
LNN01
BK
3
LNN01
BK
5
S471
LNN01
GY-BU
3
SBBC7
GY-RD
2
C3750
DATA
VBATT
REAR TRAFFIC ADVISOR FLASHING LEDS LH
151-57
GND
1
C3750
GD349
BK-VT
96-1
MX
SBBC7
WH-RD
14
C438
SBBC7
WH-RD
4
C447
S472
LNN01
GY-BU
3
SBBC7
GY-RD
2
C3751
DATA
VBATT
REAR TRAFFIC ADVISOR FLASHING LEDS RH
151-57
GND
1
C3751
S473
GD349
BK-VT
6
C447
17
C438
GD349
BK-GY
G404
10-24
SBBC7
WH-RD
2
C248
SBBC7
WH-RD
1
C2238
SBBC7
WH-RD
taped to harness

N0183980

Section 5: Electrical

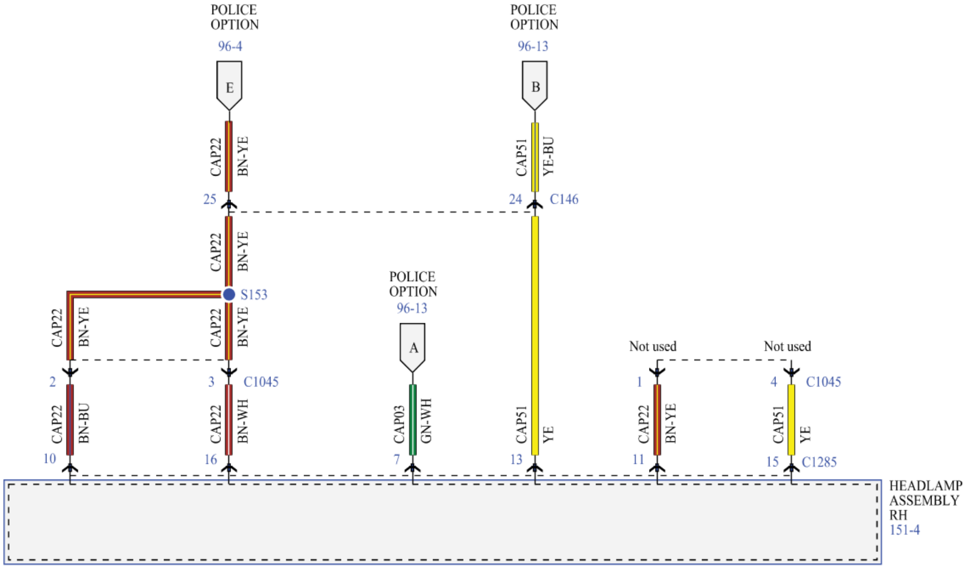
POLICE HEADLAMPS


LIGHTING/SIREN CONTROL MODULE
151-44
FLASHER
12 C4808A
CAP51 YE-BU
7 C3853
CAP51 YE-BU
10 C200
CAP51 YE-GN
S163
CAP51 YE-BU
CAP51 YE-BU
B
96-14
POLICE OPTION
24 C110
CAP51 YE-OG
13
POLICE OPTION
96-4
D
CAP22 BN-YE
29 C110
CAP22 BN-YE
S142
CAP22 BN-YE
CAP22 BN-YE
2
4 C1133
CAP22 BN-GN
CAP22 BN-RD
10
15
POLICE OPTION
96-14
A
CAP03 GN-WH
1 C1134
CAP04 GN-WH
2 C1134
CAP04 GY
7
Not used
Not used
1
3 C1133
CAP22 BN-YE
CAP22 BN-WH
11
16 C1284
HEADLAMP ASSEMBLY LH
151-2

N0183981

Section 5: Electrical

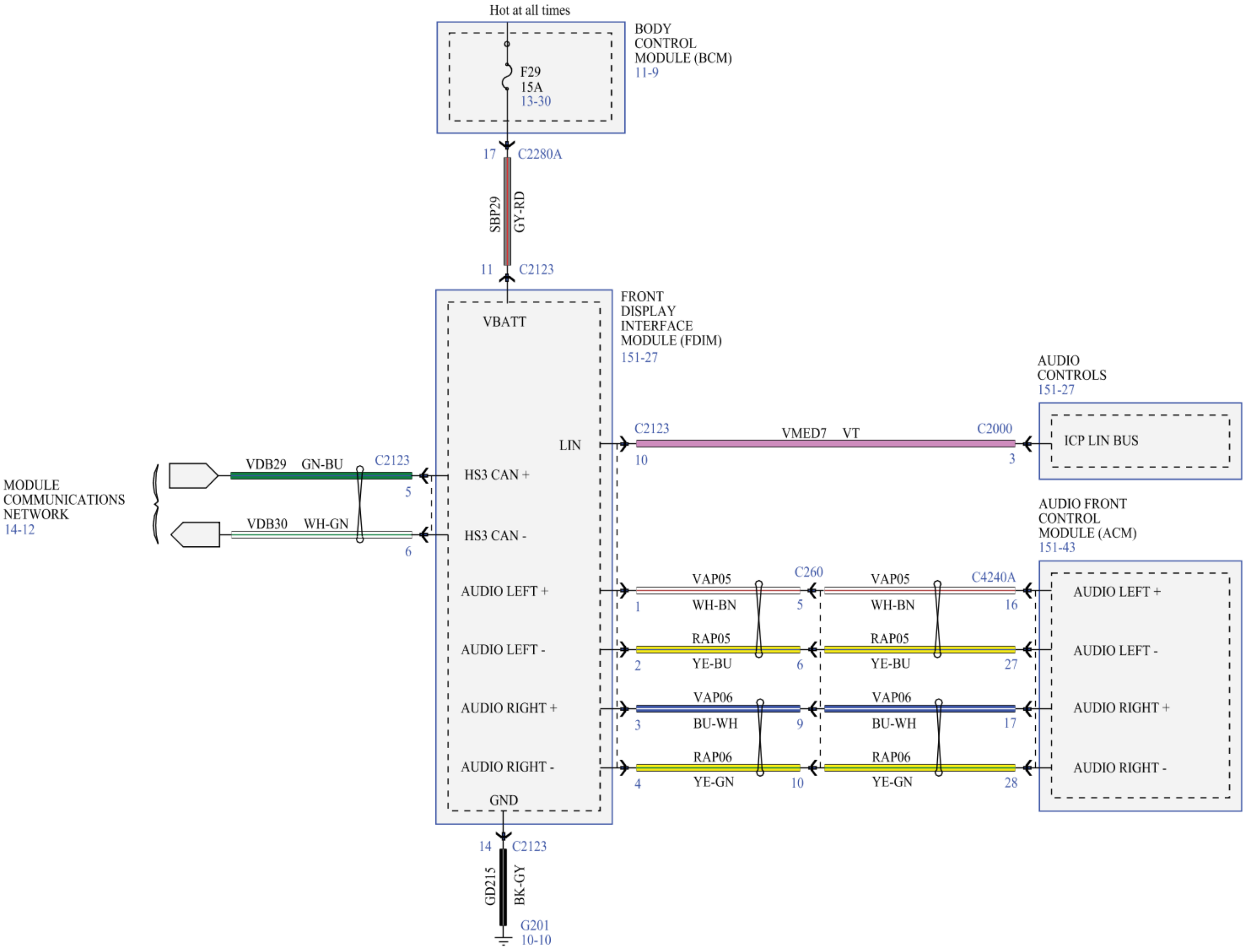
POLICE HEADLAMPS


POLICE OPTION
96-4
E
CAP22
BN-YE
POLICE OPTION
96-13
B
CAP51
YE-BU
25
24
C146
CAP22
BN-YE
S153
CAP22
BN-YE
CAP22
BN-YE
POLICE OPTION
96-13
A
Not used
Not used
2
3
C1045
1
4
C1045
CAP22
BN-BU
CAP22
BN-WH
CAP03
GN-WH
CAP51
YE
CAP22
BN-YE
CAP51
YE
10
16
7
13
11
15
C1285
HEADLAMP ASSEMBLY RH
151-4

N0183982

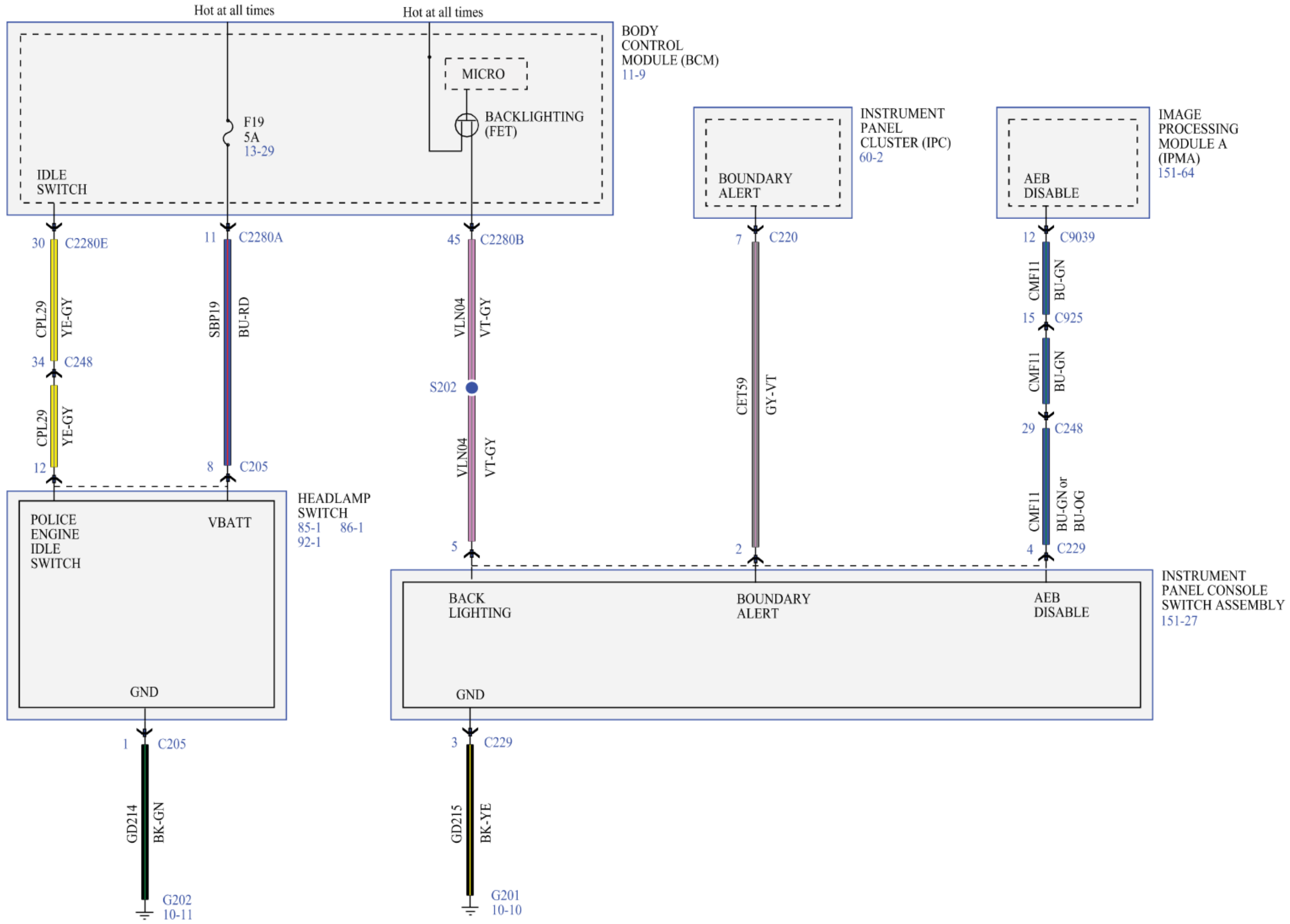
Section 5: Electrical

POLICE WITH 12.1" SCREEN


Hot at all times
BODY CONTROL MODULE (BCM)
11-9
F29
15A
13-30
17
C2280A
SBP29
GY-RD
11
C2123
FRONT DISPLAY INTERFACE MODULE (FDIM)
151-27
VBATT
LIN
C2123
10
VMED7 VT
C2000
3
AUDIO CONTROLS
151-27
ICP LIN BUS
MODULE COMMUNICATIONS NETWORK
14-12
VDB29 GN-BU
C2123
5
HS3 CAN +
VDB30 WH-GN
6
HS3 CAN -
AUDIO FRONT CONTROL MODULE (ACM)
151-43
AUDIO LEFT +
VAP05
WH-BN
1
C260
5
VAP05
WH-BN
C4240A
16
AUDIO LEFT +
AUDIO LEFT -
RAP05
YE-BU
2
6
RAP05
YE-BU
27
AUDIO LEFT -
AUDIO RIGHT +
VAP06
BU-WH
3
9
VAP06
BU-WH
17
AUDIO RIGHT +
AUDIO RIGHT -
RAP06
YE-GN
4
10
RAP06
YE-GN
28
AUDIO RIGHT -
GND
14
C2123
GD215
BK-GY
G201
10-10

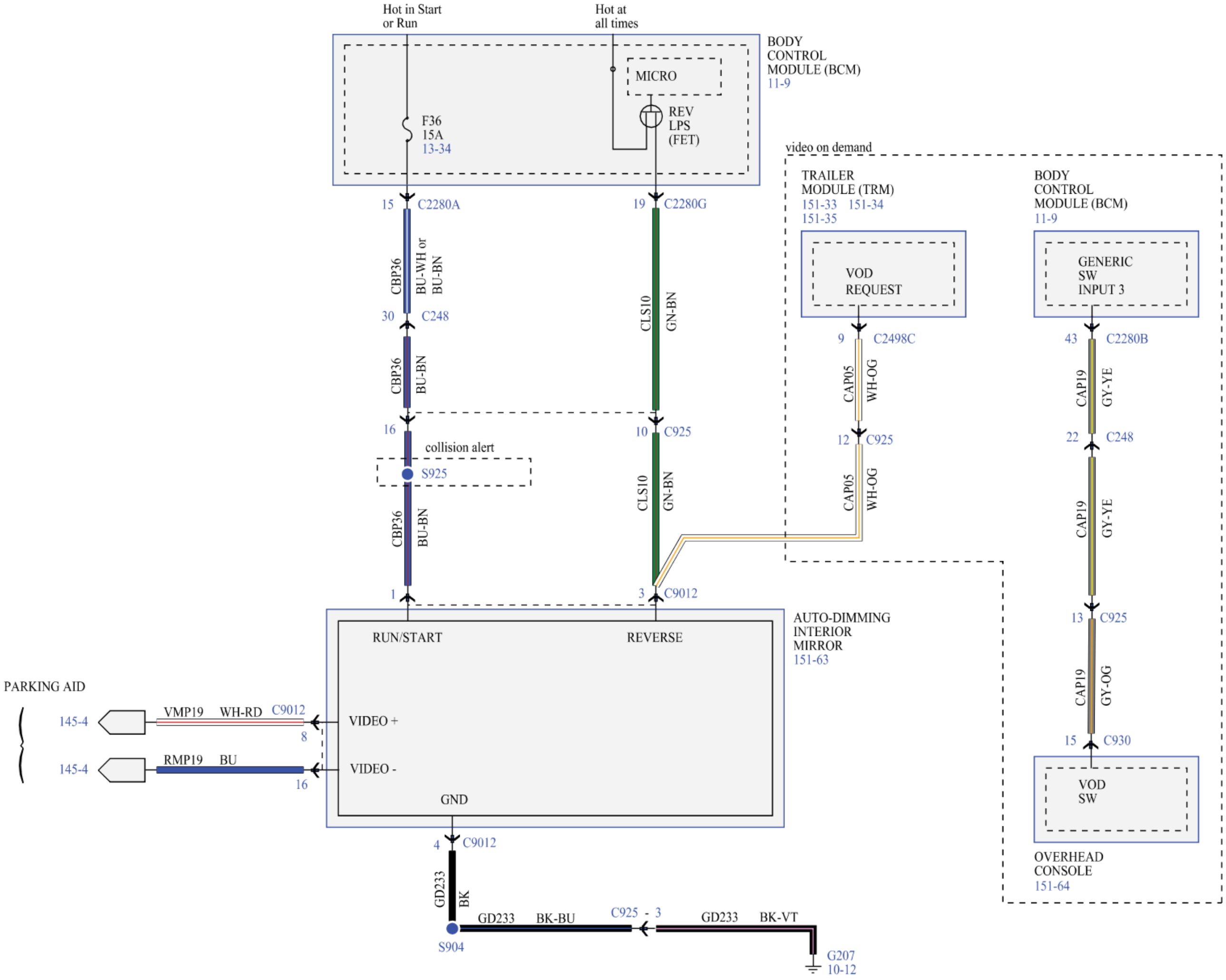
N0183983

Section 5: Electrical


Hot at all times
Hot at all times
BODY CONTROL MODULE (BCM)
11-9
MICRO
BACKLIGHTING (FET)
F19
5A
13-29
IDLE SWITCH
INSTRUMENT PANEL CLUSTER (IPC)
60-2
BOUNDARY ALERT
IMAGE PROCESSING MODULE A (IPMA)
151-64
AEB DISABLE
30 C2280E
CPL29 YE-GY
34 C248
CPL29 YE-GY
12
11 C2280A
SBP19 BU-RD
8 C205
45 C2280B
VLN04 VT-GY
S202
VLN04 VT-GY
5
7 C220
CET59 GY-VT
2
12 C9039
CMF11 BU-GN
15 C925
CMF11 BU-GN
29 C248
CMF11 BU-GN or BU-OG
4 C229
HEADLAMP SWITCH
85-1 86-1
92-1
POLICE ENGINE IDLE SWITCH
VBATT
GND
1 C205
GD214 BK-GN
G202
10-11
INSTRUMENT PANEL CONSOLE SWITCH ASSEMBLY
151-27
BACK LIGHTING
BOUNDARY ALERT
AEB DISABLE
GND
3 C229
GD215 BK-YE
G201
10-10

N0183984

Section 5: Electrical


Hot in Start or Run
Hot at all times
BODY CONTROL MODULE (BCM) 11-9
MICRO
REV LPS (FET)
F36 15A 13-34
15 C2280A
19 C2280G
CBP36 BU-WH or BU-BN
30 C248
CBP36 BU-BN
CLS10 GN-BN
16
10 C925
collision alert
S925
CBP36 BU-BN
CLS10 GN-BN
1
3 C9012
video on demand
TRAILER MODULE (TRM) 151-33 151-34 151-35
VOD REQUEST
9 C2498C
CAP05 WH-OG
12 C925
CAP05 WH-OG
BODY CONTROL MODULE (BCM) 11-9
GENERIC SW INPUT 3
43 C2280B
CAP19 GY-YE
22 C248
CAP19 GY-YE
13 C925
CAP19 GY-OG
15 C930
VOD SW
OVERHEAD CONSOLE 151-64
AUTO-DIMMING INTERIOR MIRROR 151-63
RUN/START
REVERSE
VIDEO +
VIDEO -
GND
PARKING AID
145-4
VMP19 WH-RD C9012
8
145-4
RMP19 BU
16
4 C9012
GD233 BK
S904
GD233 BK-BU
C925 3
GD233 BK-VT
G207 10-12

N0183985

Table of Contents

Contents **PAGE**

Section 6: Mounting 6-2
- Push Bumpers 6-2
- Vehicle Interior Partitions 6-2
- Seatbelt Opperation 6-3
- Siren and Grille Lights 6-3
- Mounting Equipment to the Vehicle 6-3
- Airbag, Safety Restraint System and Side Impact Sensor Component Description and Location 6-3
- Airbag Deployment Interference 6-8
- Front Seat Headrest 6-9
- Seat Attaching Bolts 6-9
- Roof Bow Locations 6-16
- Cargo Area View 6-17
- Areas to Avoid When Choosing Mounting Locations 6-17
- High Voltage System Components 6-18
- Fuel System Components 6-19
- Brake System Components 6-19
- Exhaust System Components 6-20
- Floor Drain 6-20

Section 6: Mounting

Section 6: Mounting

Push Bumpers

Ford Motor Company understands it may be desirable to install a push bumper mounted on the front of emergency vehicles. The installation of push bumpers may adversely affect certain safety systems and/or performance aspects of your vehicle. You should consider the following when deciding whether to install a push bumper, the type of push bumper, and the appropriate installation.

Effect on Driver Assist Features

Driver assist features require sensors and cameras to monitor areas around the vehicle. Some push bumper designs may block or restrict the ability of the sensors and cameras to monitor the area around the vehicle. This could prevent the driver assist feature(s) from performing as designed and provide the intended safety benefit.

Effect on Air Bag Deployment

Different push bumper designs may each have unique deformation characteristics in a crash situation that may or may not affect the deployment of air bags. Without the benefit of crash tests on vehicles equipped with push bumpers (there are a number of different styles available), it is the opinion of Ford Motor Company that installation of some push bumpers could affect the timing of the air bag deployment.

Effect on Weight Distribution

The balance and weight distribution of a vehicle is carefully planned to achieve optimal stability, handling, and braking. Push bumpers can change this weight distribution by adding excessive weight to the front of the vehicle. There are many different styles of push bumpers available. Depending on the mounting and weight of the push bumper to be installed, it could have an adverse effect on the handling of a vehicle. Always verify the vehicle ride height after the addition of a push bumper. Adjust the ride weight if the measurements are not within specifications.

Effect on Air Flow

The powertrain cooling system on a vehicle relies on proper airflow through the radiator to keep the powertrain at its proper operating temperature. When adding a push bumper to a vehicle, make sure this airflow is not obstructed, especially when light and sirens are mounted on the push bumper. Reduced airflow could put additional strain on the cooling system and shorten the operational life of the related components. Elevated temperatures may also result in a reduced performance mode of operation intended to prevent temperature increase that may operate in a reduced power mode. During the installation process, keep the placement of components away from the grille area of the vehicle. For any components mounted in the grille area above the bumper, use factory-installed locations and do not exceed sizing of factory-installed components to maintain required airflow. Do not mount equipment below the bumper in front of the lower front fascia opening.

Vehicle Interior Partitions

Ford Motor Company understands it may be desirable to install partitions between certain areas inside the vehicle. The installation of partitions may adversely affect certain safety systems and/or occupants and K-9 passengers. You should consider the following when deciding whether to install a partitions, the type of partition, and the appropriate installation.

Effect on Air Bag Deployment

Care must be taken when selecting and installing partitions to prevent the partition from restricting the deployment path of air bags, routing of air bag wiring to the air bags and aftermarket police equipment (examples include, lights, siren, radios, antenna, video, etc.) wiring that may use the same routing path and restrict/prevent air bags from deploying. If the partition restricts the deployment path, the air bag may not fully deploy and/or its rate of deployment changed such that it will not provide the designed protection for the vehicle. Damage to the wiring and/or connectors that control the deployment of the air bags may prevent the air bag from deploying either fully or at the intended timing.

Occupant Protection

For air bags to perform as designed, a vehicle upfit must not affect the as-designed full deployment and timing of deployment. Federal Motor Vehicle Safety Standards (FMVSS) and Canadian Motor Vehicle Safety Standards (CMVSS) provide information regarding occupant area requirements. FMVSS/CMVSS requirements should be consulted when selecting and installing a partition and the occupant area created. Occupant safety can also be affected by contact with a hard surface (i.e., steel, etc.) or with aftermarket partitions and equipment, as a result of, for example, traffic collision, emergency response-type driving conditions, etc.

Occupant Comfort

The design of the partition may affect air flow from the vehicle climate control (heating/cooling) system if air flow inside the vehicle is restricted. Vehicle climate control venting can be considered with the design of the partition for temperature considerations.

Interior Equipment Mounting

⚠ **WARNING:**

Interior trim panels should not be used for mounting police equipment.

Section 6: Mounting

Seatbelt Opperation

⚠ **WARNING:**
The partition and the installation hardware of the partition must not interfere with the proper operation of the safety belt, safety belt retractor, side impact sensor and the safety belt height adjusters. Failure to follow these instructions may result in personal injury.

Siren and Grille Lights

NOTICE:
Do not modify the cooling system. High voltage vehicle components may be damaged if any cooling system modifications are attempted.

The cooling system relies on proper airflow through the radiator to keep components at their proper operating temperature. When adding sirens and grille lights to a vehicle, make sure this airflow is not obstructed. Reduced airflow could put additional strain on the cooling system and shorten the operational life of related components. The cooling system also cools the electric motors and electronics. If the coolant exceeds certain temperatures, the components will attempt to protect themselves by limiting the power and torque available. During the installation process, keep the placement of components away from the grille area of the vehicle.

Mounting Equipment to the Vehicle

- Do not mount equipment to the high voltage (orange) wiring/cables, the high voltage cover or the HVTB cooling plenum.
- Do not mount equipment on the instrument panel between the driver and passenger airbags due to deployment variability.
- Do not mount equipment on the instrument panel between the driver and the pedals, between the door and the console area due to knee airbag deployment variability.
- Do not mount equipment obstructing the HVTB service disconnect located under the hood, LH side of the engine compartment.
- Do not remove or block the HVTB cooling plenum or ducts. These components are necessary for the proper cooling of the HVTB.
- Do not cover any warning or vehicle labels.
- ***NOTICE:***
  The side impact sensors are tuned to excite based on their mass (including wiring), as well as the host sheet metal. Any alteration to these components must be avoided. Additions such as padding, wire connectors, retainers, tape or fasteners of any kind should not be used. All fasteners in this predominantly sheet metal environment should be made of steel or a non-conductive plastic to guarantee retention and longevity. If any part of a steel fastener is exposed to a wet area, it should be plated to resist corrosion.
- Do not mount equipment to the A, B, C, or D-pillars.
- Do not mount equipment on the headliner within 200 mm (8 in) of the side edges.
- Do not mount equipment above the beltline within 200 mm (8 in) of the side glass from the A-pillar leading edge to the rear edge of the D-pillar.
- Do not mount equipment on the headliner along the siderails.
- Do not install a partition, divider or equipment that spans the vehicle above the beltline.

Airbag, Safety Restraint System and Side Impact Sensor Component Description and Location

The safety belt retractors are located in the base of the B-pillars. The pretensioner located in the retractor is referred to as the safety belt retractor pretensioner. In the event the Restraints Control Module (RCM) senses an impact, pretensioners provide improved occupant protection by rapidly removing slack from the safety belt. Removing slack from the safety belt helps to properly position the occupant and allows for maximum effectiveness of the safety belts and the airbags.

- Do not use the safety belt retractor bolts for mounting the partition.
- Do not mount any partition hardware on the inboard side of the B-pillar within the bottom 305 mm (12 in).
- Do not mount any partition hardware that will interfere with the proper sealing of the door.
- Do not mount any police hardware to block and/or reduce the design intent function of driver safety systems such as auto emergency brakeing camera if equipped.

Section 6: Mounting

NOTE:

The effectiveness of all safety system sensing equipment should be reviewed duirng the upfit process to ensure design intent function.

The side impact sensors are located in the front doors and C-pillars; one sensor in each door and in each C-pillar. The location and orientation are critical for the correct operation of all the impact sensors. Do not use the attachment bolts of the impact sensors to mount any equipment.

The RCM is mounted under the front of the center console. The RCM orientation is critical for proper operation of the restraint systems. Do not relocate or use the RCM mounting bolts for attachment purposes of any equipment.

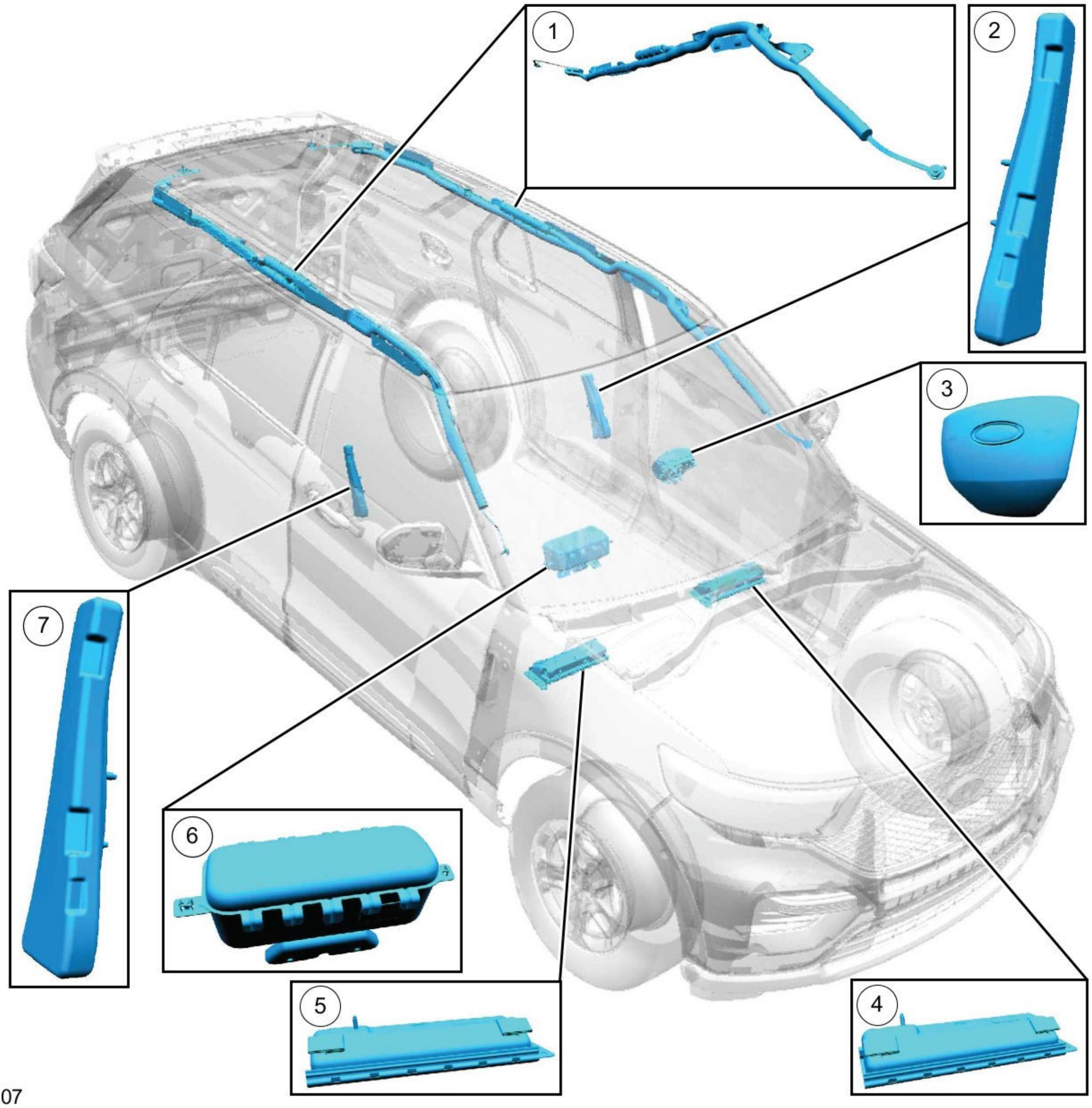
Various safety restraints exist within the vehicle, the restraint system includes various modules, sensors, retractors, airbags and the safety belt systems. Refer to the workshop manual for more detail on the safety restraint system.

NOTE:

If OEM rear seat belt, buckles and pre-tensioner cannot be used as design intent, retaining and securing them will prevent OEM warning notifications to occupants, but the vehicle modifier is responsible for providing an alternative safety restraints system that meets FMVSS requirements.

NOTE:

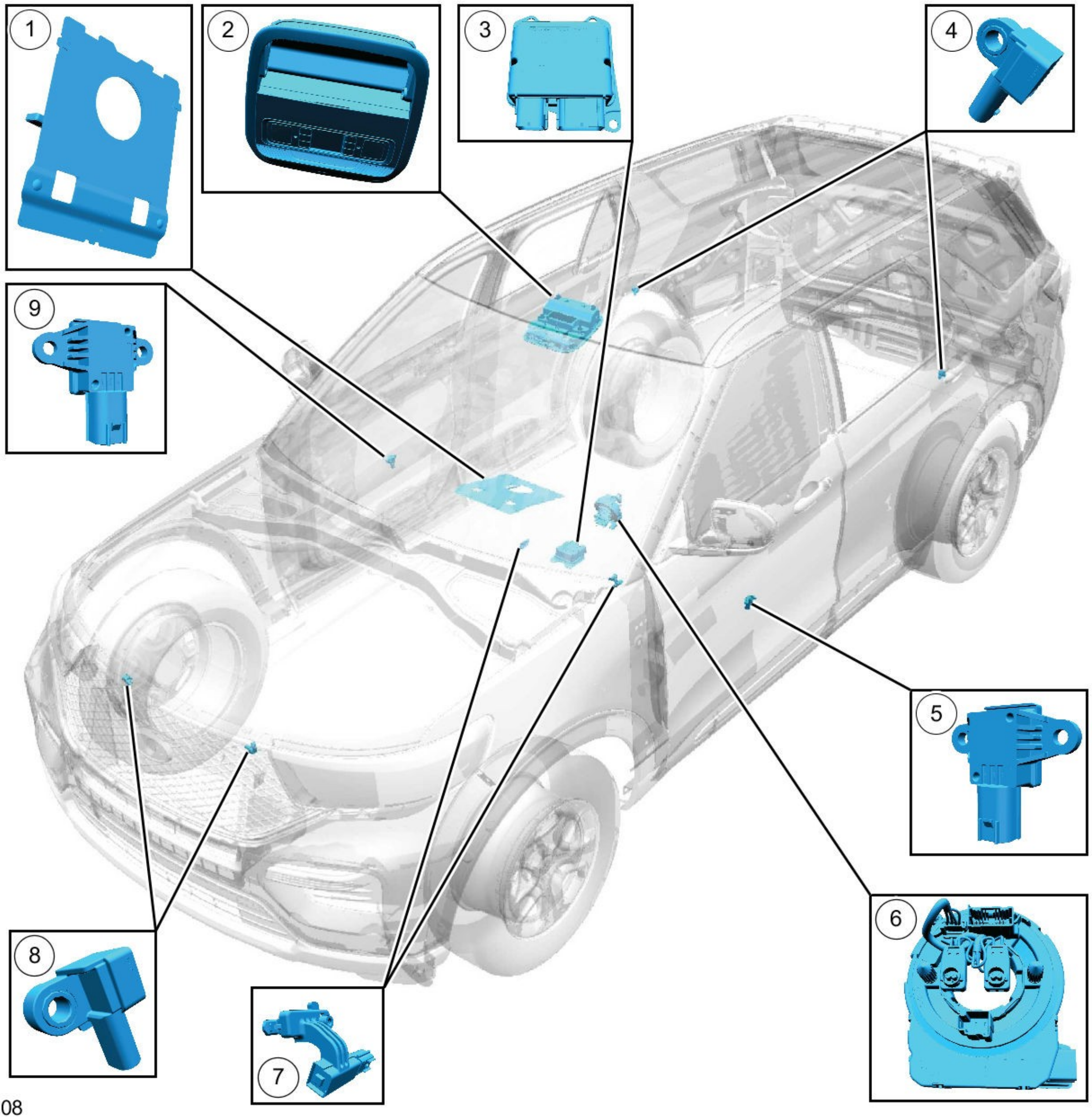
Airbag, safety restraint system and side impact sensor component location shown below.



N0179807

Section 6: Mounting

Item	Description
1	Driver and passenger side curtain airbag
2	Driver side airbag
3	Driver airbag
4	Driver knee airbag
5	Passenger knee airbag
6	Passenger airbag (includes canister vent)
7	Passenger side airbag

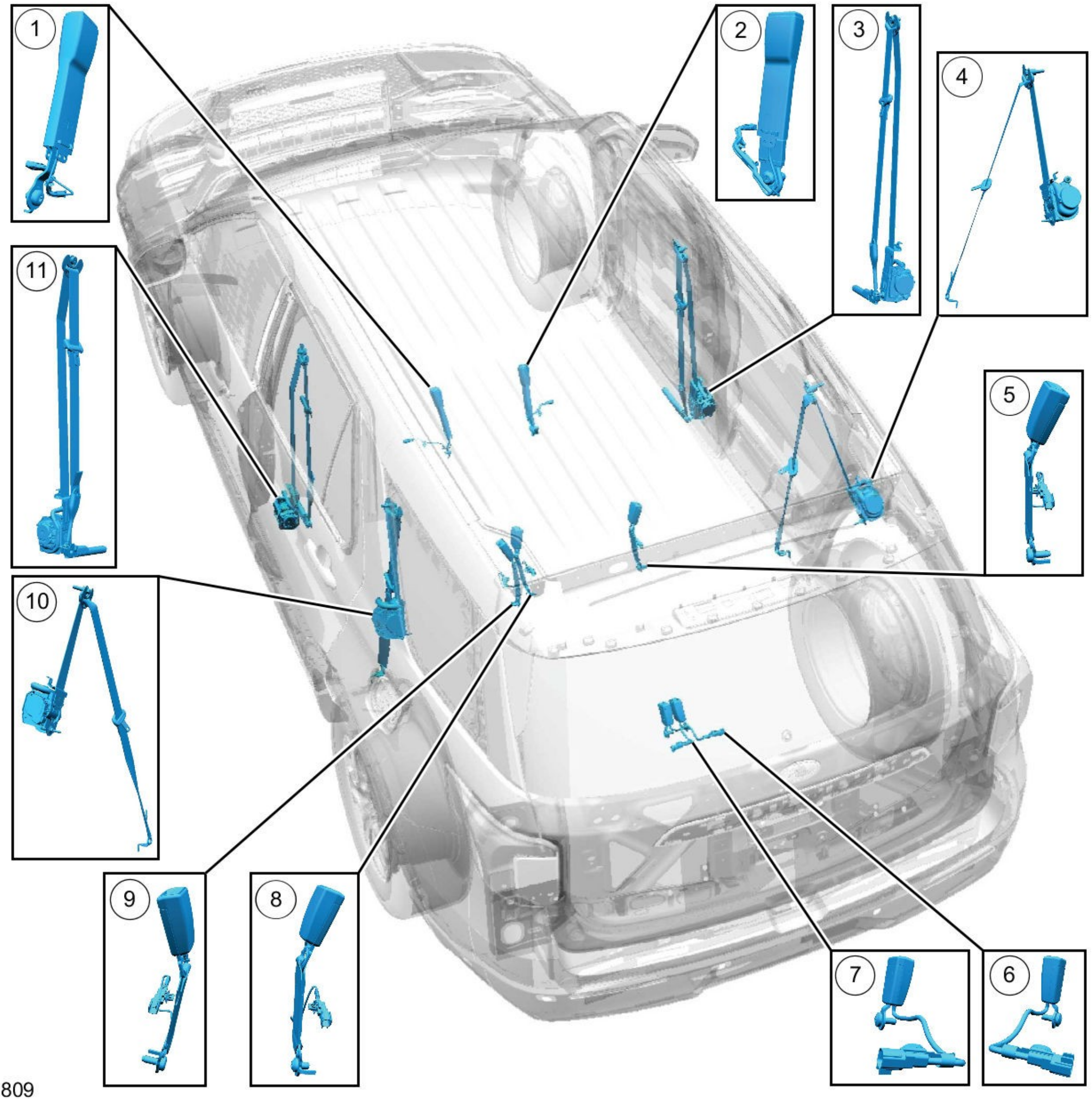


N0179808

Section 6: Mounting

Item	Description
1	OCSM (occupant classification system module) (includes OCS (occupant classification system) sensor and gel-filled bladder)
2	Overhead console (includes PAD (passenger airbag deactivation) indicator)
3	RCM (restraints control module)
4	Driver and passenger C-pillar side impact sensors
5	Driver front door side impact sensor
6	Clockspring
7	Seat position sensors
8	Driver and passenger front impact severity sensors
9	Passenger front door side impact sensor

Section 6: Mounting



Item	Description
1	Driver seatbelt buckle (includes buckle sensor)
2	Front passenger seatbelt buckle (includes buckle sensor and Belt Tension Sensor (BTS)
3	Front passenger seatbelt retractor (includes retractor pretensioner, retractor load limiter and anchor pretensioner)
4	Second row passenger side outer seatbelt retractor (includes retractor pretensioner)
5	Second row passenger side outer seatbelt buckle (includes seatbelt buckle switch)

Section 6: Mounting

(Continued)

6	Third row passenger side seatbelt buckle (includes seatbelt buckle switch)
7	Third row driver side seatbelt buckle (includes seatbelt buckle switch)
8	Second row center seatbelt buckle (if equipped) (includes seatbelt buckle switch)
9	Second row driver side outer seatbelt buckle (includes seatbelt buckle switch)
10	Second row driver side outer seatbelt retractor (includes retractor pretensioner)
11	Driver seatbelt retractor (includes retractor pretensioner)

Airbag Deployment Interference

⚠ **WARNING:**
Do not place objects or mount equipment in front of the airbag module cover or in the front seat area; this is to avoid contact with a deploying airbag. Placing objects on or over the airbag inflation area may cause those objects to be propelled by the airbag. Failure to follow these instructions may result in personal injury.

⚠ **WARNING:**
Dash, tunnel or console-mounted equipment should be placed only within their specified zone. Failure to follow this instruction may result in personal injury.

⚠ **WARNING:**
Do not mount equipment between the side of the front seat and the door trim that would block deployment of the side airbag. Failure to follow this instruction may result in personal injury.

⚠ **WARNING:**
Do not mount equipment on the instrument panel between the driver and the pedal area, between the door and the console that may come in contact with or block a deploying knee airbag. Failure to follow this instruction may result in personal injury.

⚠ **WARNING:**
Do not attempt to service, repair or modify the airbag supplemental restraint systems (SRS) or its fuses. See your Ford or Lincoln dealer. Failure to follow this instruction may result in personal injury.

⚠ **WARNING:**
Modifications to the front end of the vehicle, including frame, bumper, front end body structure, tow hooks and B-pillar surrounding parts may affect the performance of the airbag sensors, increasing the risk of injury. Do not modify the front end of the vehicle.

⚠ **WARNING:**
Do not place objects or mount equipment on or near the headliner at the siderail that may come into contact with a deploying Safety Canopy® System. Failure to follow this instruction may increase the risk of personal injury in the event of a collision.

⚠ **WARNING:**
Do not attempt to service, repair or modify the Safety Canopy® System, its fuses, the A, B, C, or D-pillar trim, or the headliner on a vehicle containing a Safety Canopy® System. See your Ford or Lincoln dealer.

⚠ **WARNING:**
To reduce risk of injury, do not obstruct or place objects in the deployment path of the inflatable Safety Canopy® System.

Section 6: Mounting

NOTICE:

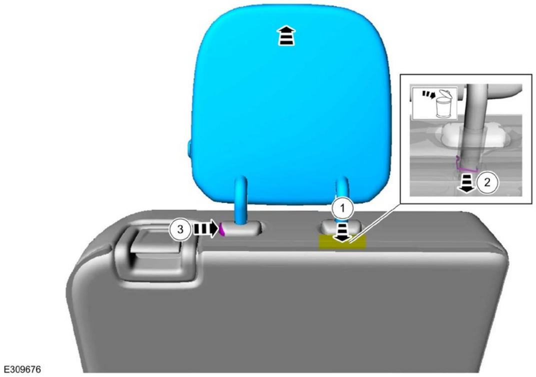
The side impact sensors are tuned to excite based on their mass (including wiring), as well as the host sheet metal. Any alteration to these components must be avoided. Additions, such as padding, wire connectors, retainers, tape or fasteners of any kind should not be used. All fasteners in this predominantly sheet metal environment should be made of steel or a non-conductive plastic to guarantee retention and longevity. If any part of a steel fastener is exposed to a wet area, it should be plated to resist corrosion.

Driver/passenger airbags affect the way equipment can be mounted in vehicles. Any surfaces that could come into contact with an airbag during deployment must not damage the airbag or alter its deployment path. Sharp edges, corners or protrusions could damage the nylon airbag material and reduce the effectiveness of the airbag. Do not mount or place any objects in the deployment path of an airbag. Airbags must be allowed to fully deploy without restriction. The deployment of airbags is not compatible with any configuration of equipment mounting that places objects in the airbag deployment path. Equipment mounted or placed in the deployment area of an airbag will reduce the effectiveness of the airbag, damage the airbag and potentially damage or dislodge the equipment.

Airbag deployment drawings are provided in Section 7. Consult the drawings before equipment is installed inside the passenger compartment to make sure that the mounted equipment does not interfere with airbag deployment.

Front Seat Headrest

1. Remove the outboard seat head restraint.
   a. Push down on the outboard seat backrest cover to gain access to the outboard seat head restraint retaining clip.
   b. Remove and discard the outboard seat head restraint retaining clip.
   c. Push the outboard seat headrest restraint release button.



Seat Attaching Bolts

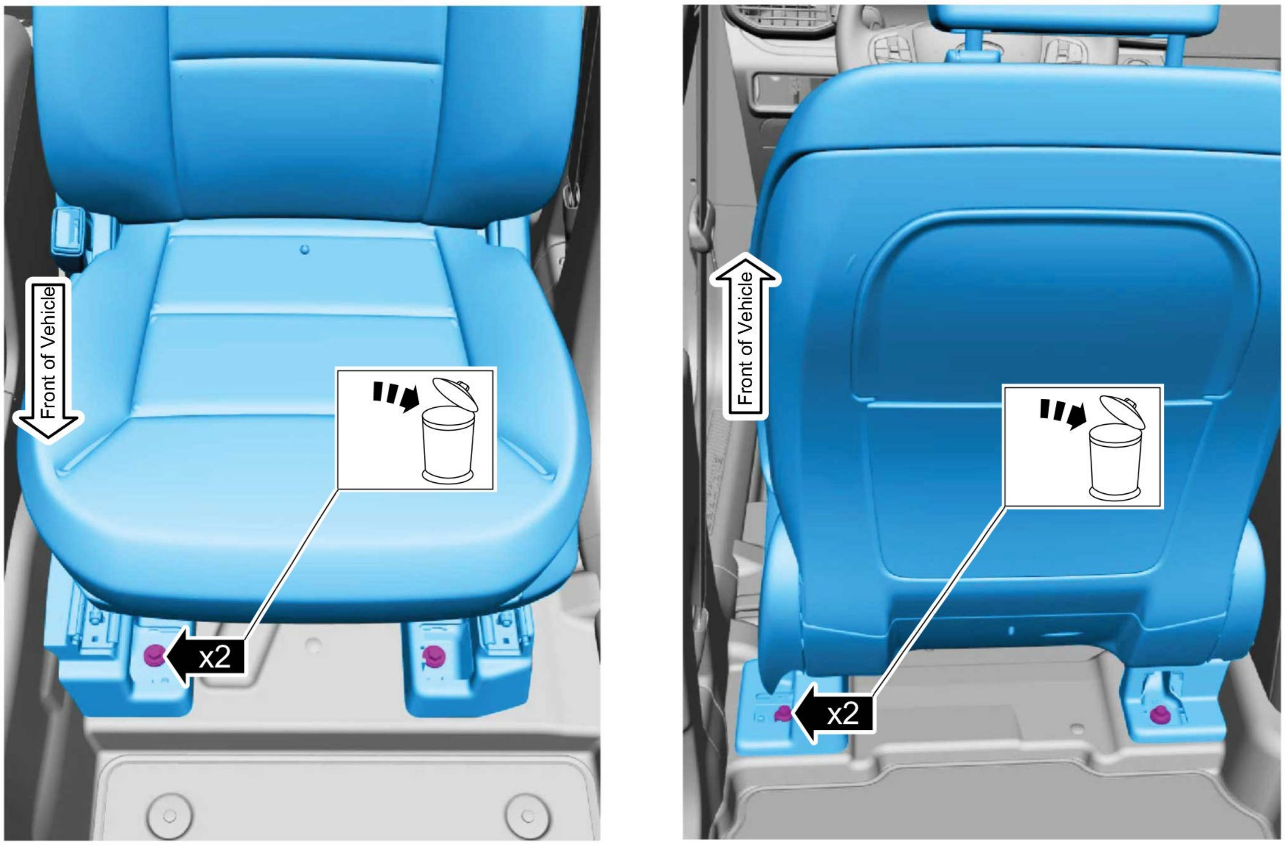
The vehicle safety belts and seat assemblies are factory installed in their correct location. Seat attaching bolts are not to be used as attachment points for any equipment. Front seat bolts are to be discarded when removed (one time use). Any added material between the seat attaching bolt and the seat frame could have unpredictable effects on the seat bolt torque. If the safety belts are removed for any reason, all of the appropriate attaching hardware must be hand started and then tightened to the correct torque specifications as per the Workshop Manual. Proper operation must be verified before returning the vehicle to service.

NOTE:

The retainers shown below are one time use. If removed, replace with a new retainer.

Section 6: Mounting

Front Seat

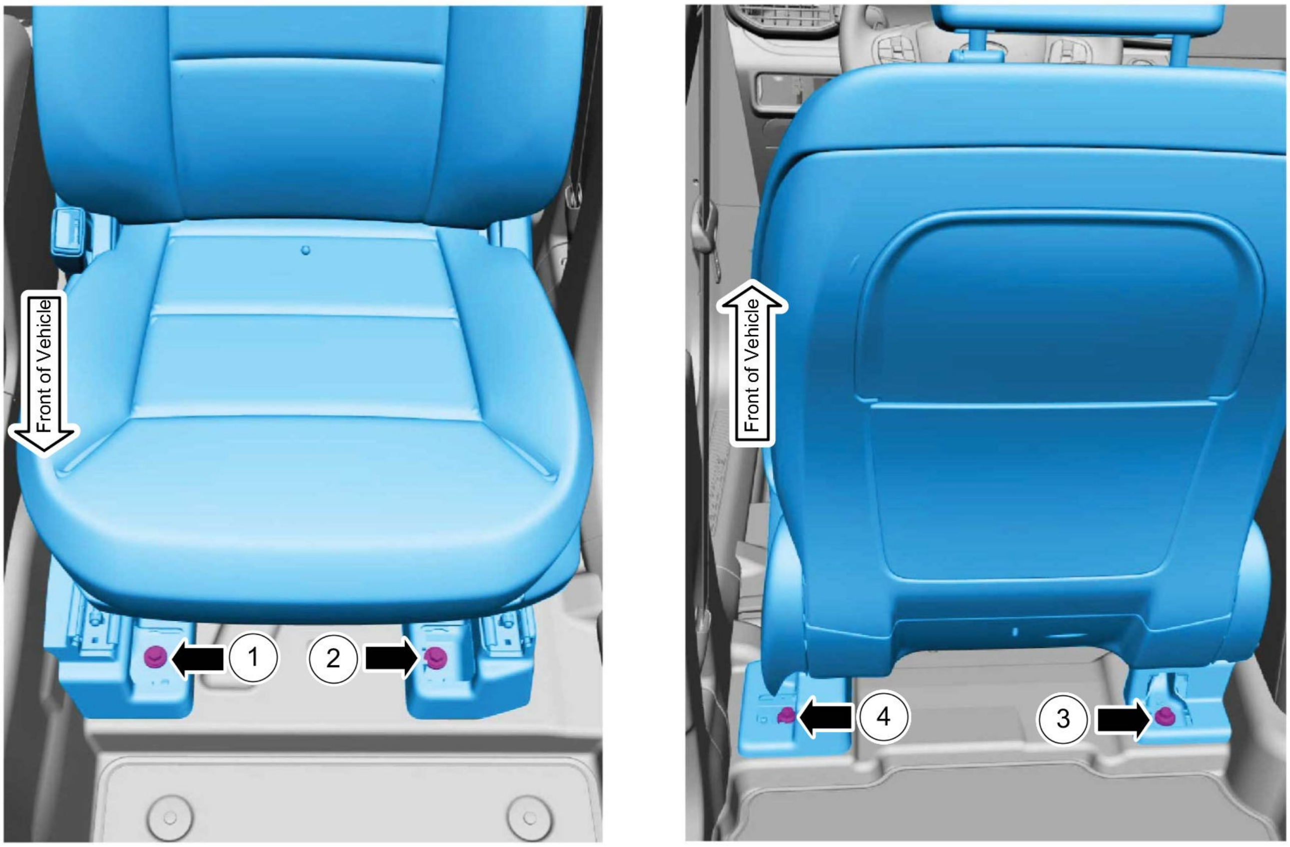

Front of Vehicle
x2
Front of Vehicle
x2

N0180476

Section 6: Mounting

NOTE:
If removed torque the bolts in the following sequence.

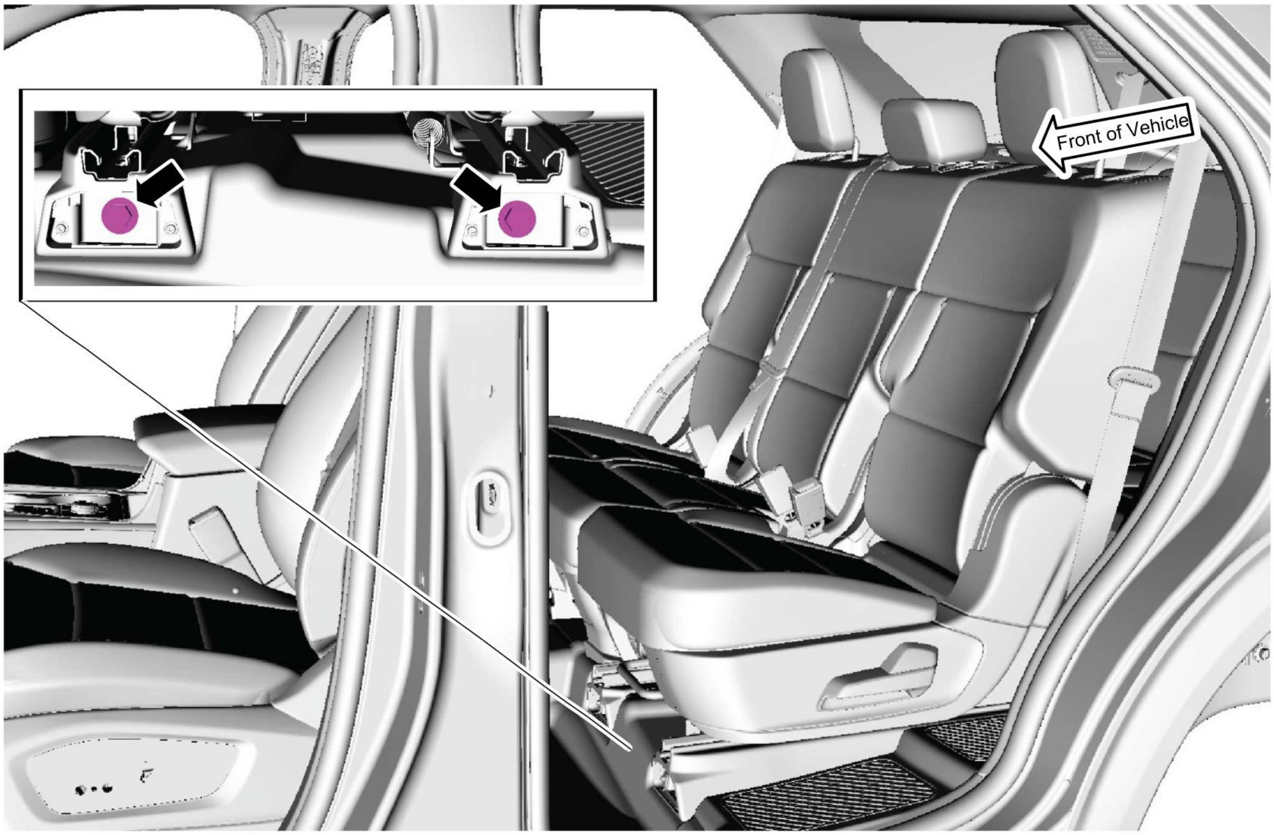
1. 35 lb.ft (47 Nm)
2. 35 lb.ft (47 Nm)
3. 35 lb.ft (47 Nm)
4. 35 lb.ft (47 Nm)


Front of Vehicle
1
2
Front of Vehicle
4
3

N0180477

Section 6: Mounting

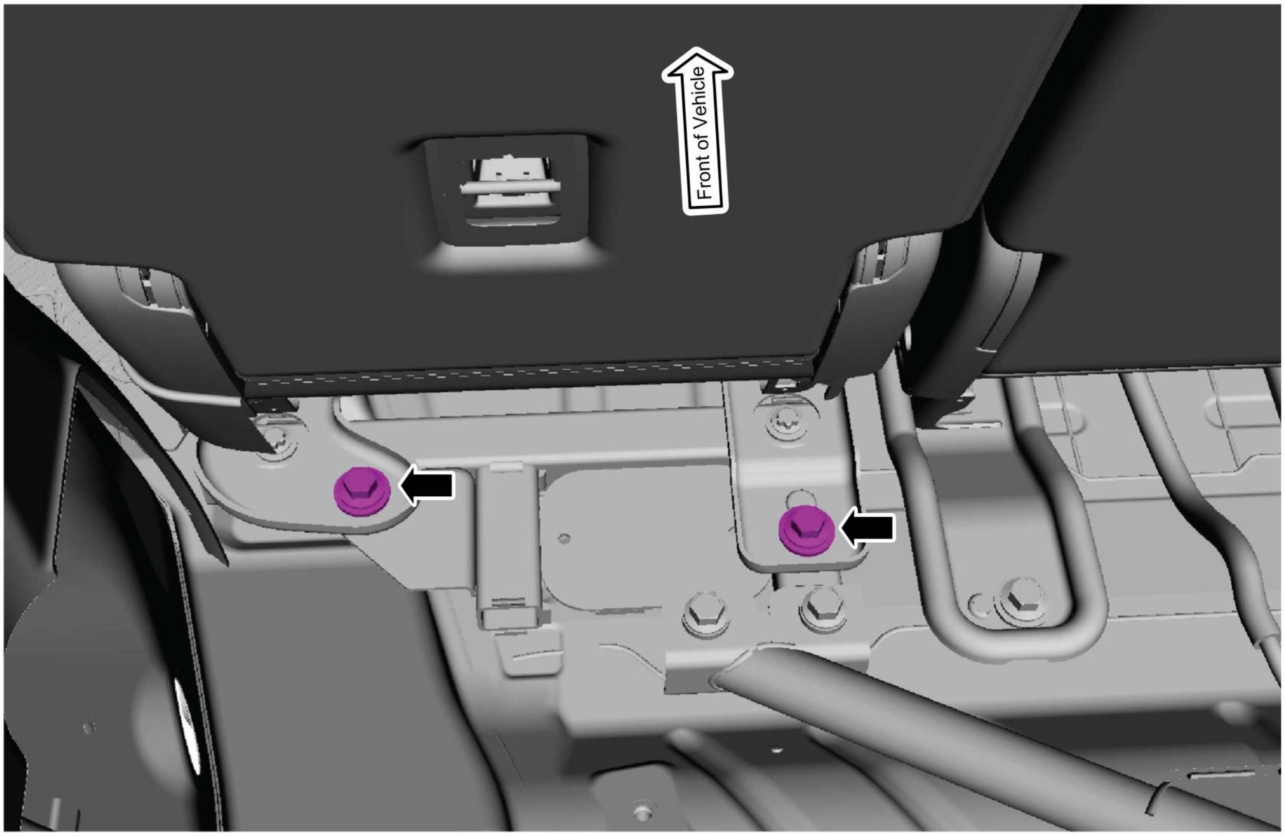
Rear Outboard Seat



N0180478

If removed, torque to 33lb.ft (45 Nm)

Section 6: Mounting

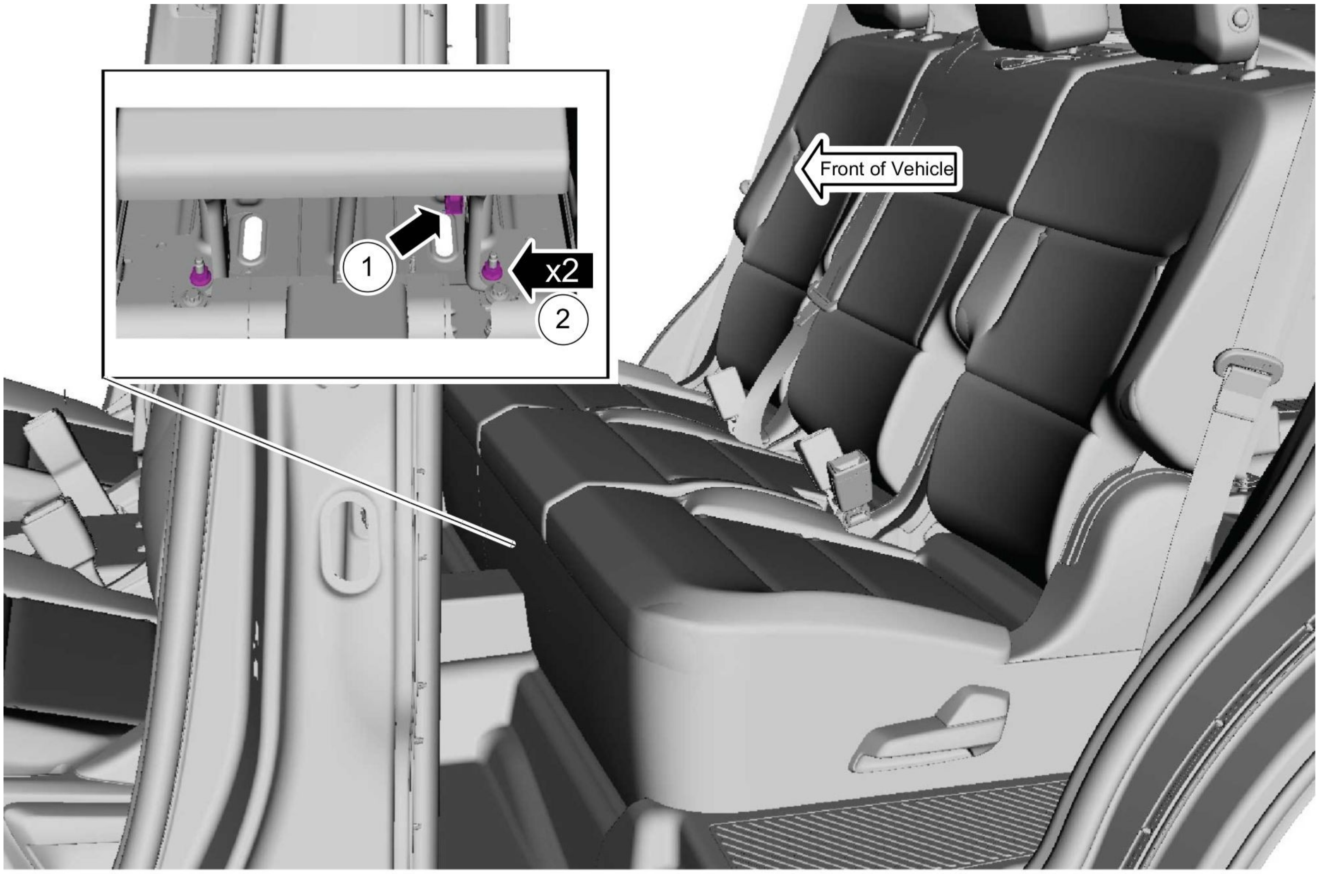


N0180479

If removed, torque to 33 lb.ft (45 Nm)

Section 6: Mounting

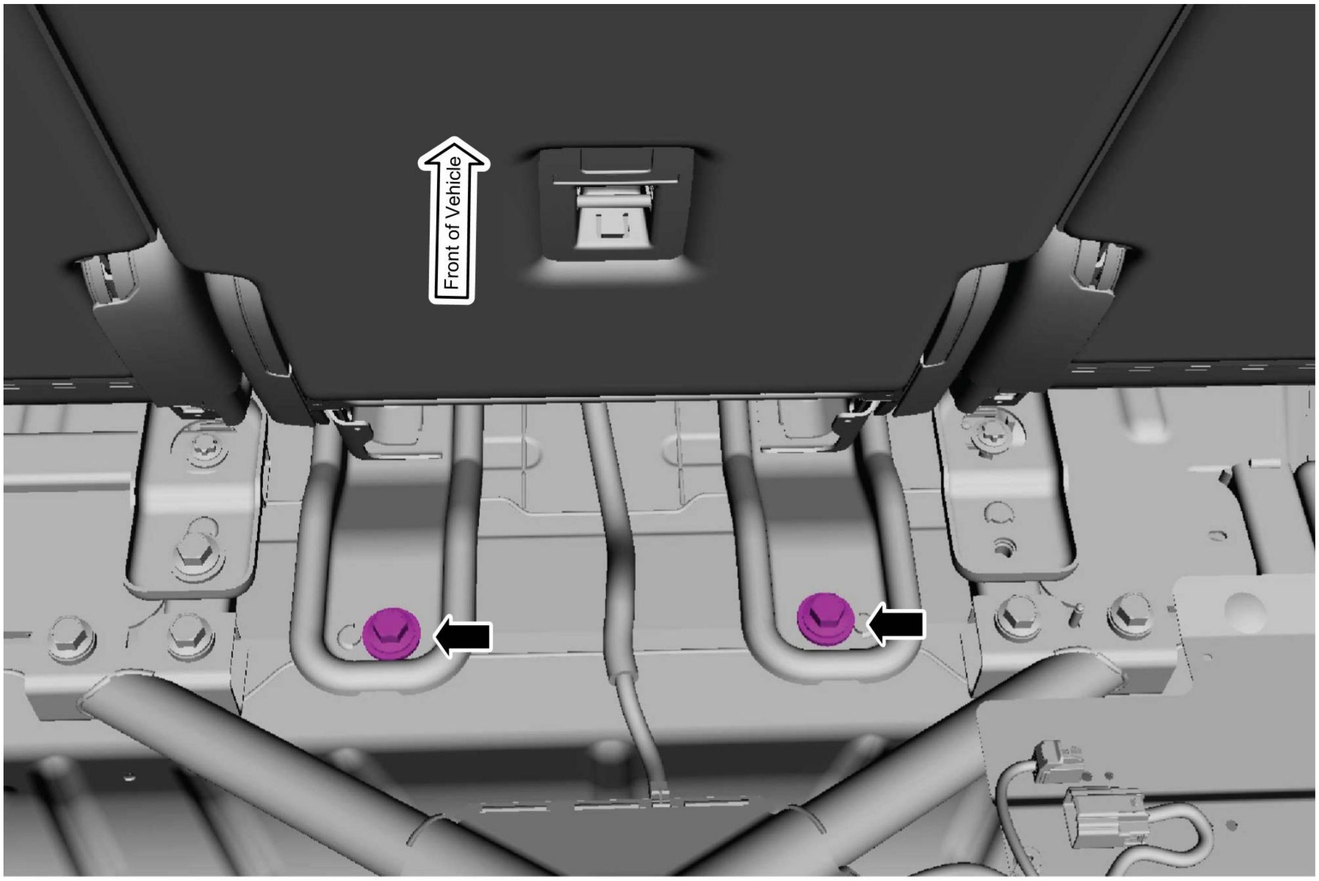
Rear Center Seat



N0180480

If removed, torque to 33lb.ft (45 Nm)

Section 6: Mounting

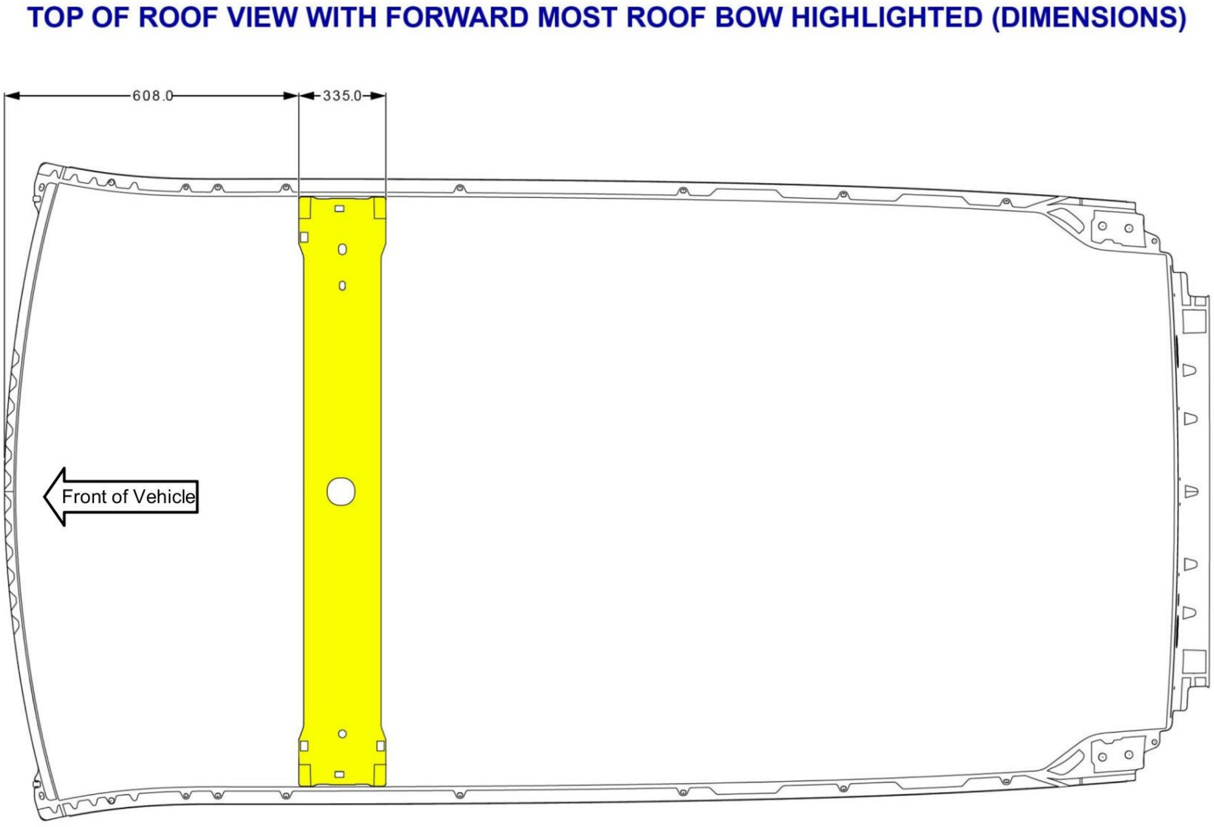


N0180481

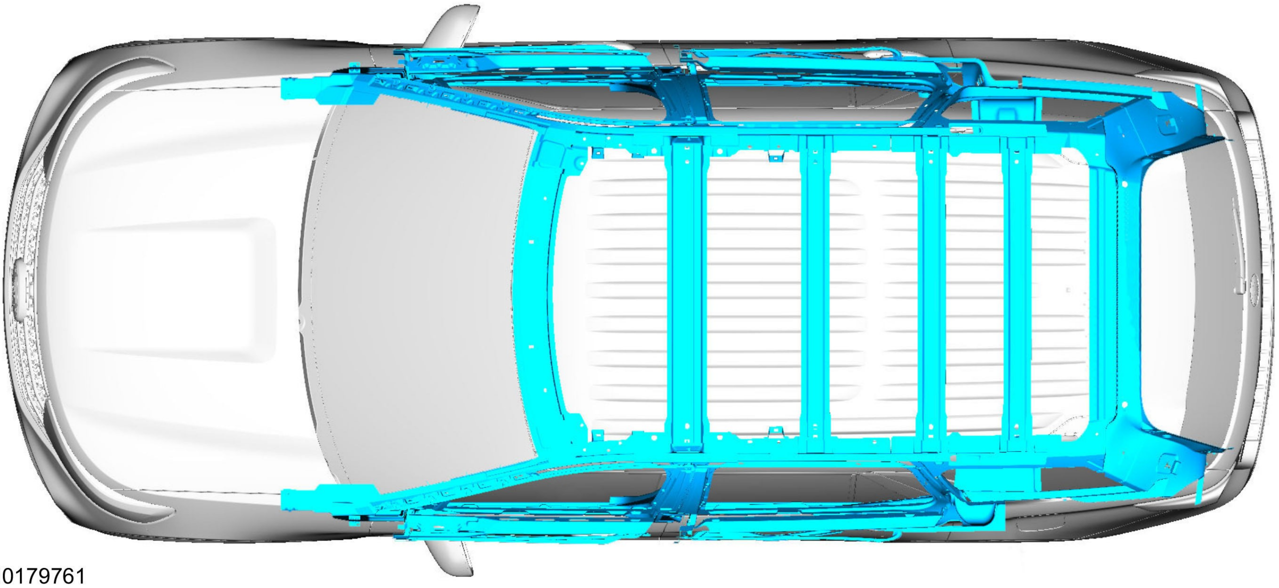
If removed, torque to 33lb.ft (45 Nm)

Section 6: Mounting

Roof Bow Locations


TOP OF ROOF VIEW WITH FORWARD MOST ROOF BOW HIGHLIGHTED (DIMENSIONS)
608.0
335.0
Front of Vehicle

N0179842

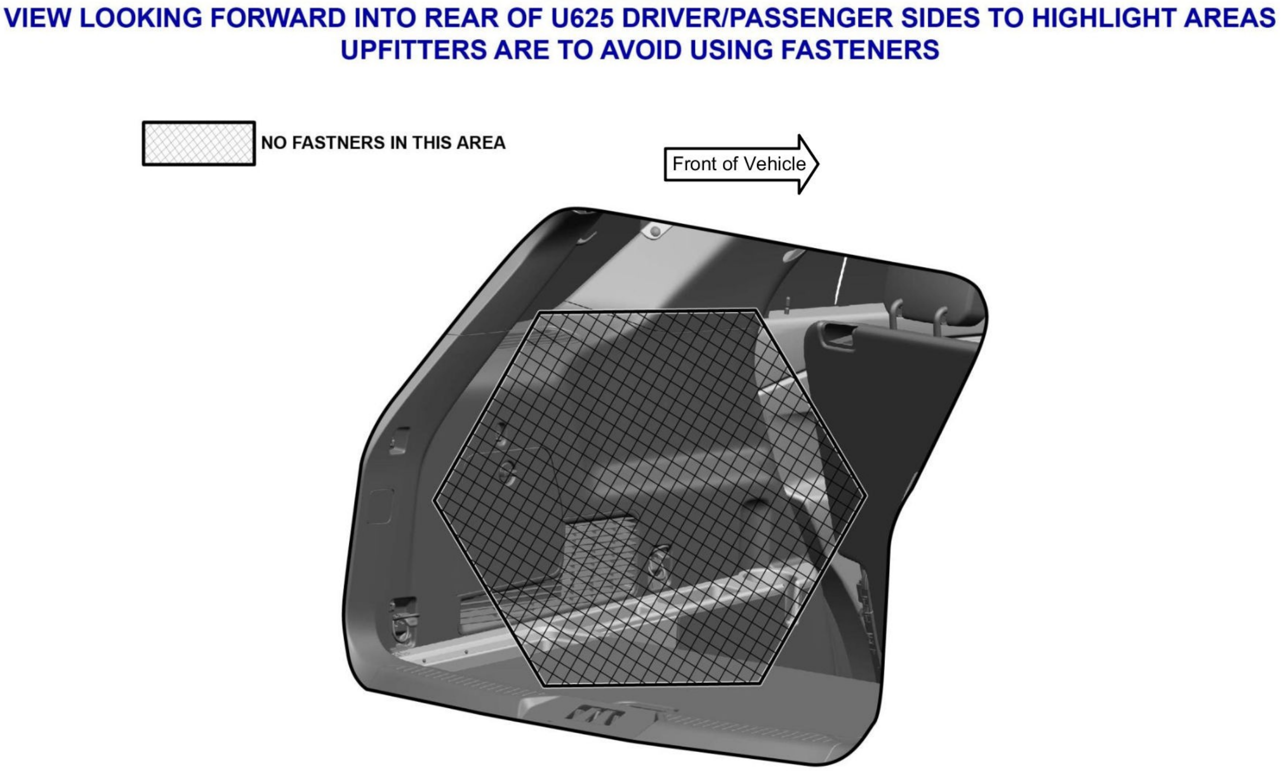


N0179761

Section 6: Mounting

Cargo Area View

Driver side of cargo area shown no fasteners should be attached to passenger side of cargo area also.


VIEW LOOKING FORWARD INTO REAR OF U625 DRIVER/PASSENGER SIDES TO HIGHLIGHT AREAS UPFITTERS ARE TO AVOID USING FASTENERS
▨ NO FASTNERS IN THIS AREA
Front of Vehicle

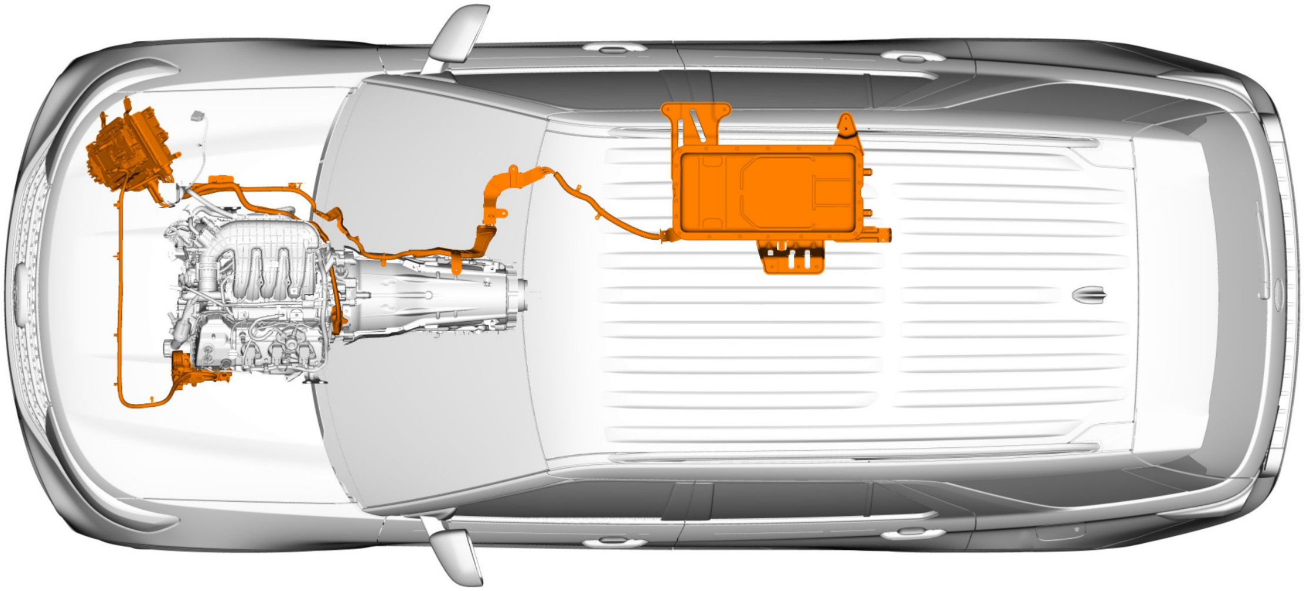
N0180482

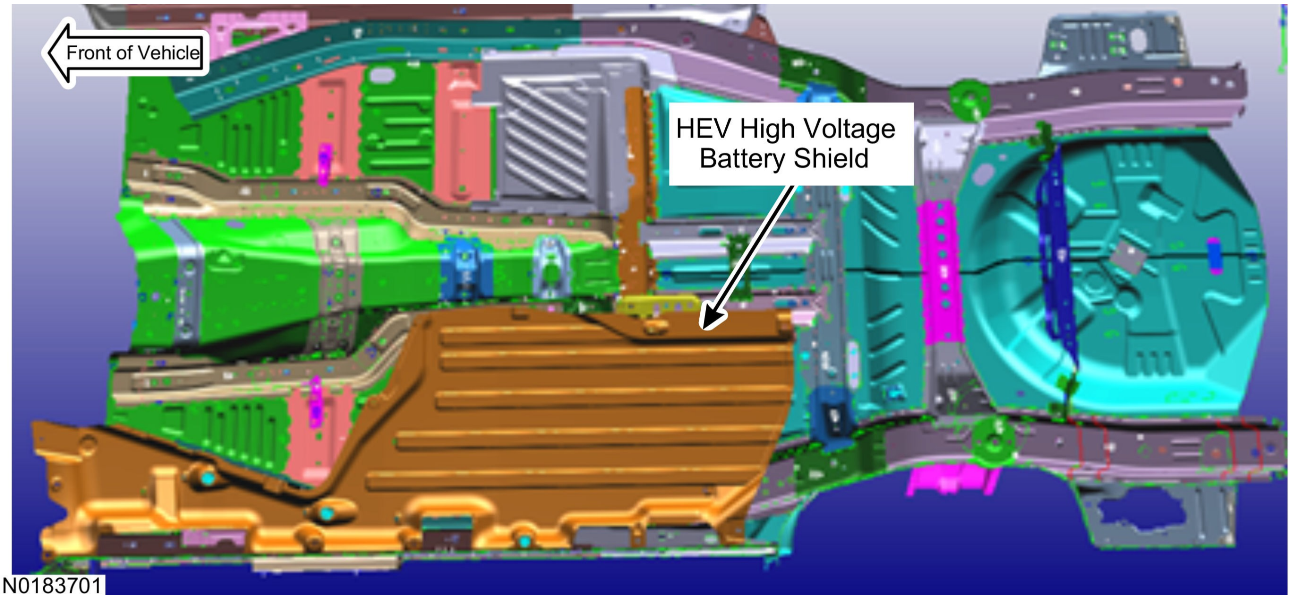
Areas to Avoid When Choosing Mounting Locations

The following illustrations show locations to avoid when choosing components mounting locations, these locations include: High Voltage Components and Cables, Fuel System Components, Brake System Components, and Exhaust Components. To avoid personal injury or damage to vehicle systems avoid drilling or mounting of components in these areas.

Section 6: Mounting

High Voltage System Components

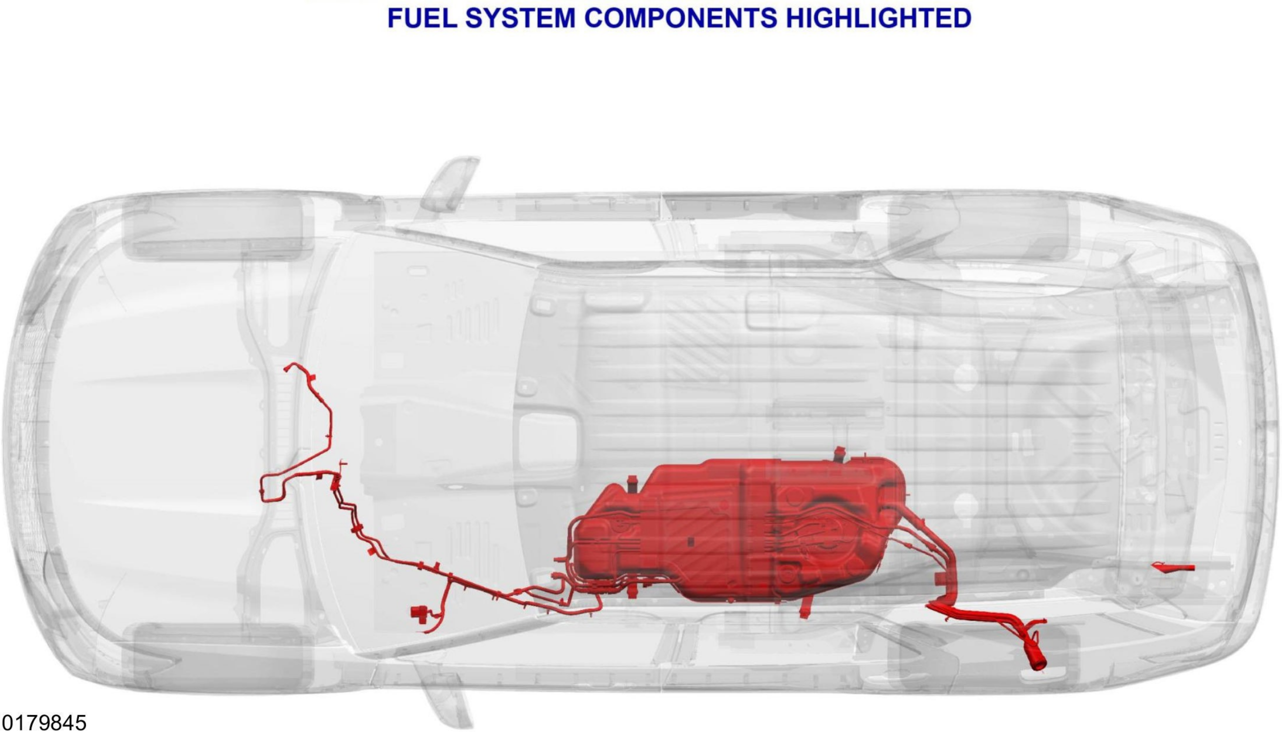

N0180458


Front of Vehicle
HEV High Voltage Battery Shield

N0183701

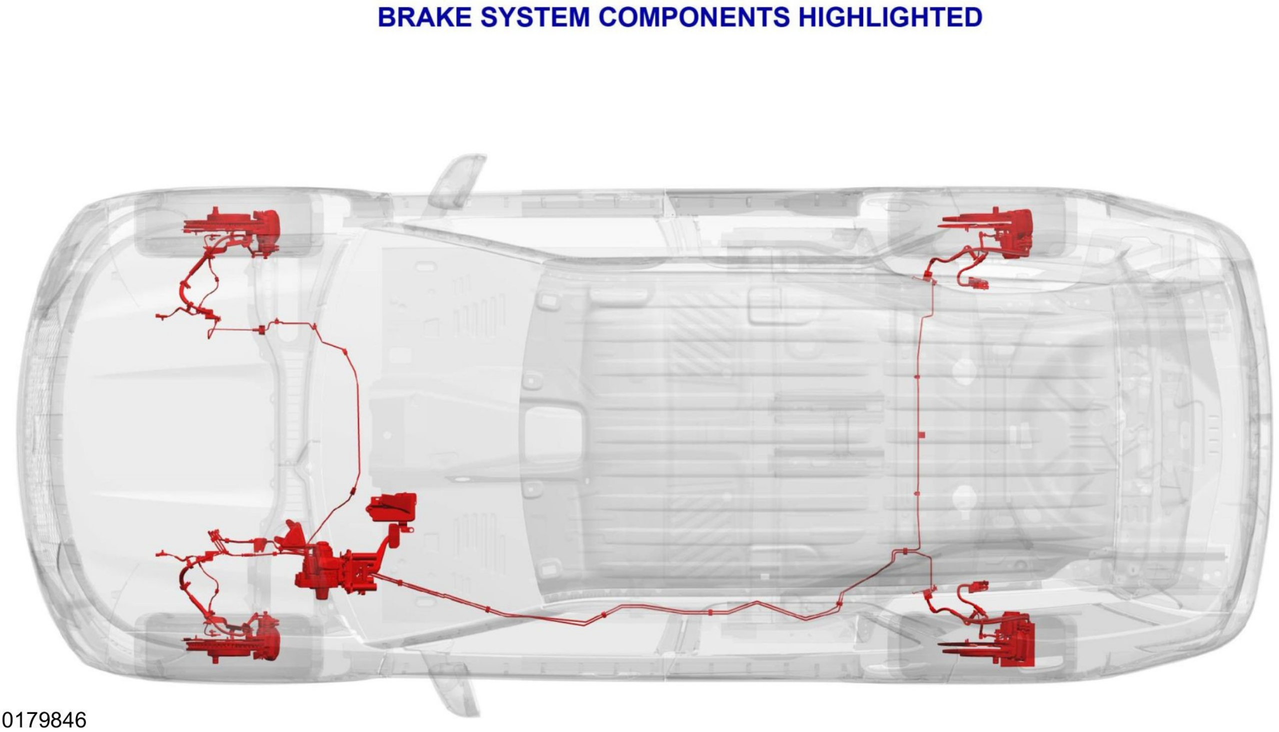
Section 6: Mounting

Fuel System Components


FUEL SYSTEM COMPONENTS HIGHLIGHTED

N0179845

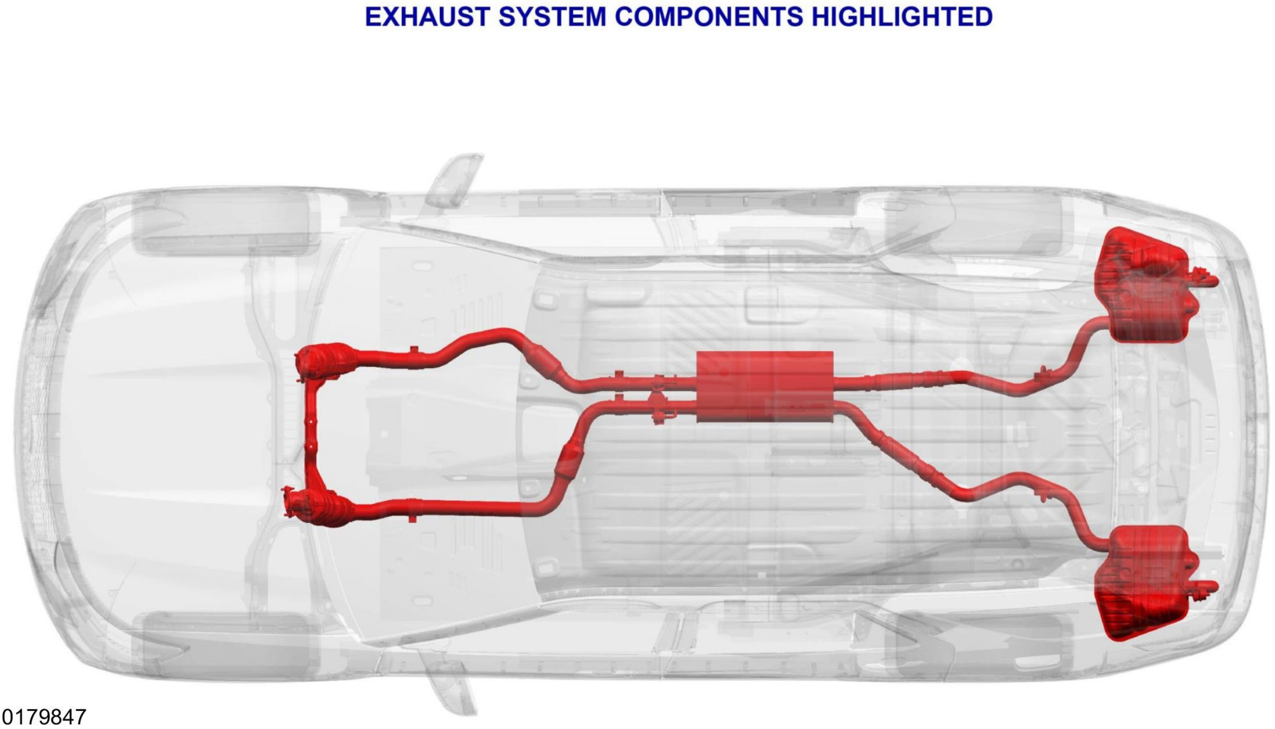
Brake System Components


BRAKE SYSTEM COMPONENTS HIGHLIGHTED

N0179846

Section 6: Mounting

Exhaust System Components



N0179847

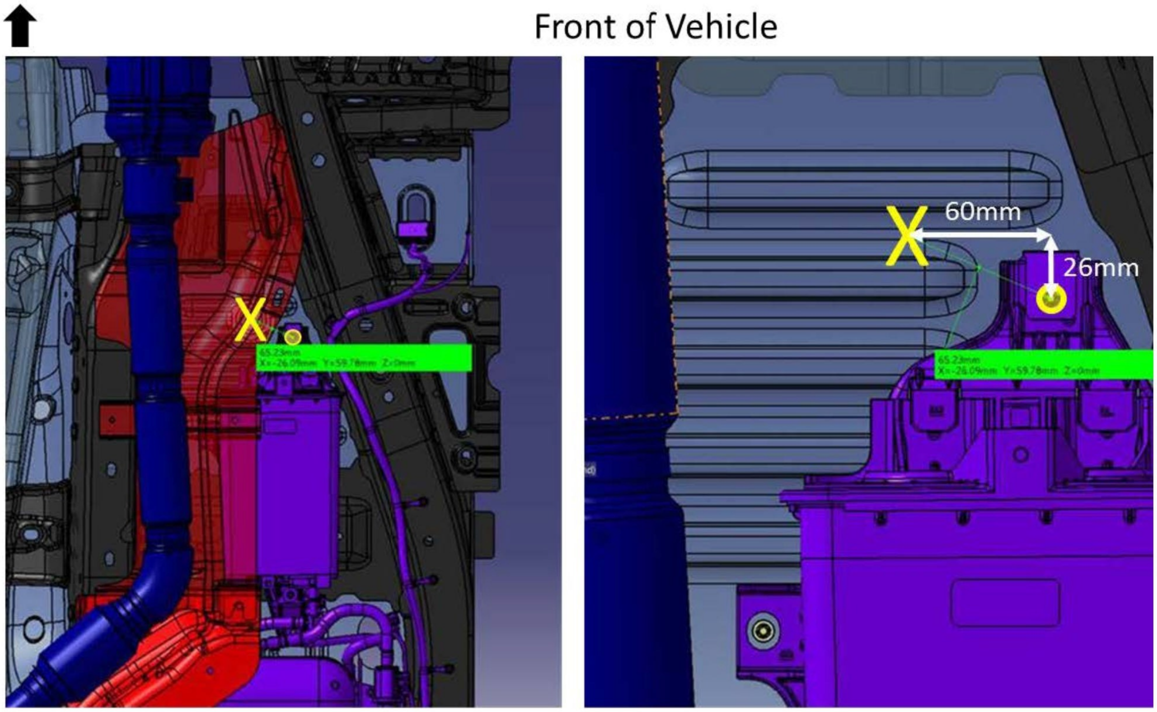
Floor Drain

2nd row passenger side V-Drains are not feasible on the Police Interceptor Utility Hybrid due to the FHEV battery location.

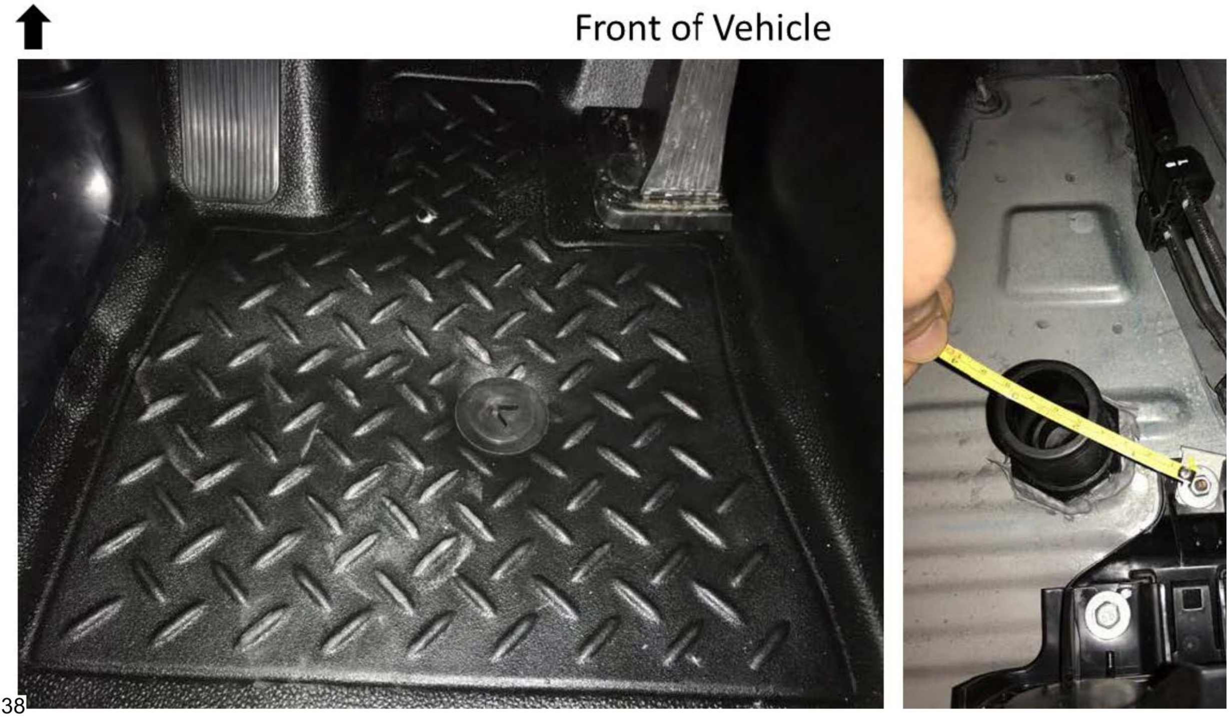
Driver's Footwell

Measure 60 mm (2.4 inches) inboard and 26 mm (1 inch) forward of the front mounting stud of evaporator canister. Center the hole on flat between floor pan ribs, as seen in the images below. All holes should be drilled from the underside of the vehicle, starting with a small pilot hole, and then moving to the appropriately sized hole saw.

Section 6: Mounting


Front of Vehicle
X
60mm
26mm
65.23mm
X=-26.09mm Y=59.78mm Z=0mm

N0182537


Front of Vehicle

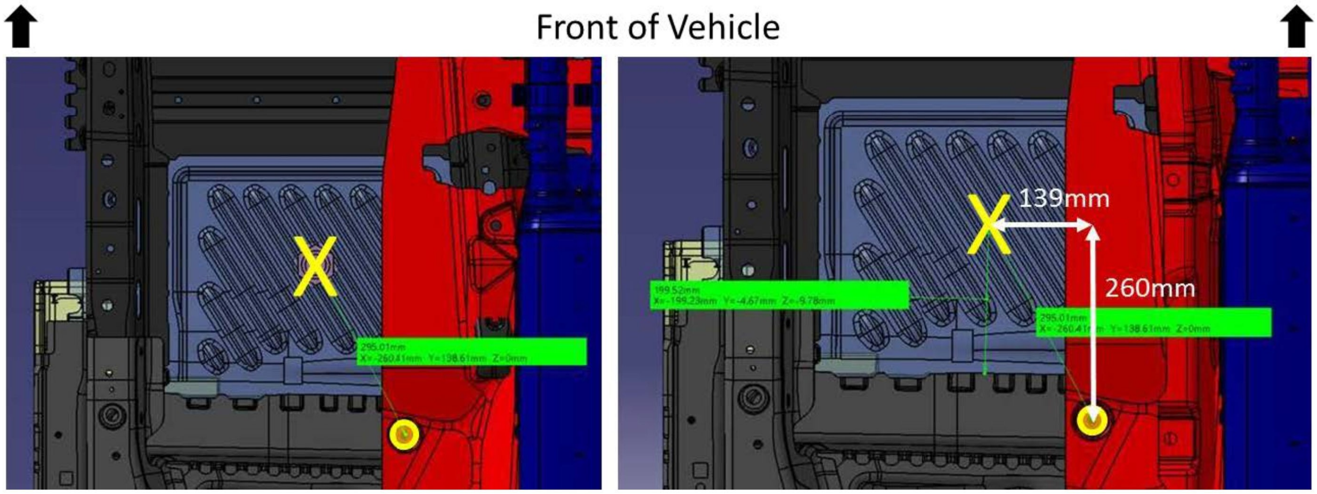
N0182538

Section 6: Mounting

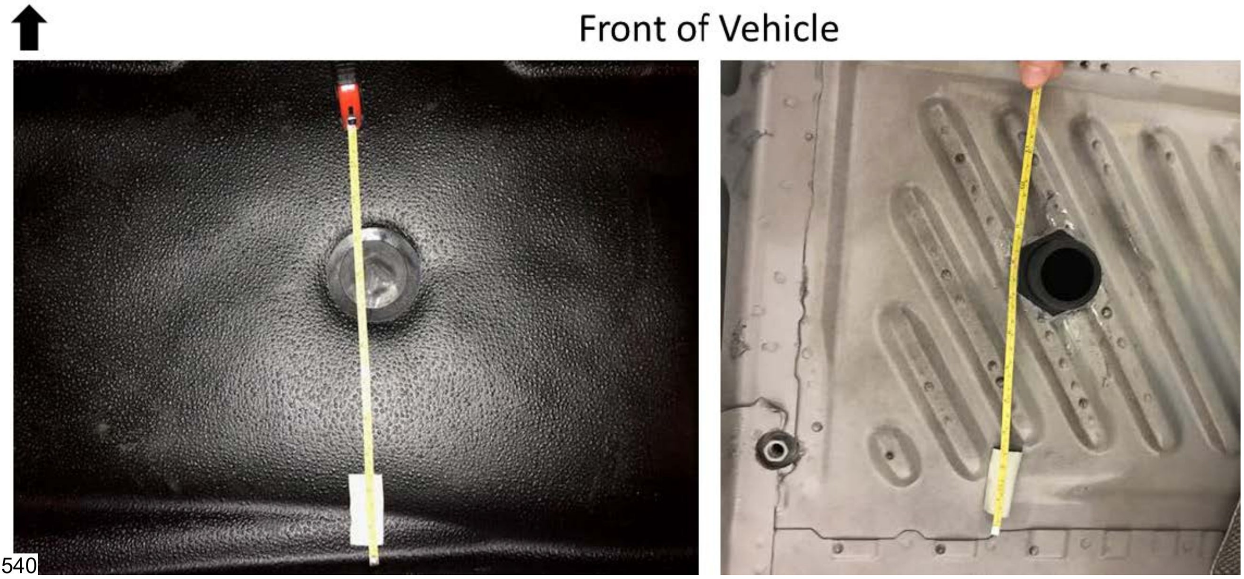
2nd Row RHS Footwell (3.3L and 3.0L gas models ONLY)

Measure 139 mm (5.5 inches) outboard and 260 mm (10.2 inches) forward of the identified heat shield stud. Center the hole on flat between floor pan ribs, as seen in the images below. All holes should be drilled from the underside of the vehicle, starting with a small pilot hole, and then moving to the appropriately sized hole saw.

NOTE:
2nd row passenger side footwell drain not feasible on hybrid models due to FHEV battery location


Front of Vehicle
X
295.01mm
X=-260.41mm Y=138.61mm Z=0mm
X
139mm
260mm
199.52mm
X=-199.23mm Y=-4.67mm Z=-9.78mm
295.01mm
X=-260.41mm Y=138.61mm Z=0mm

N0182539


Front of Vehicle

N0182540

Table of Contents

Contents **PAGE**

Section 7: Airbag Deployment Interference Zones 7-2
  Airbag Deployment Interference Zones 7-2

Section 7: Airbag Deployment Interference Zones

Section 7: Airbag Deployment Interference Zones

Airbag Deployment Interference Zones

⚠ **WARNING:**
Do not place objects or mount equipment in front of the airbag module cover or in the front seat area; this is to avoid contact with a deploying airbag. Placing objects on or over the airbag inflation area may cause those objects to be propelled by the airbag. Failure to follow these instructions may result in severe personal injury or death.

⚠ **WARNING:**
Dash, tunnel or console-mounted equipment should be placed only within their specified zone. Failure to follow this instruction may result in severe personal injury or death.

⚠ **WARNING:**
Do not mount equipment between the side of the front seat and the door trim that would block deployment of the side airbag. Failure to follow this instruction may result in personal injury.

⚠ **WARNING:**
Do not attempt to service, repair or modify the airbag supplemental restraint systems (SRS) in any way. Failure to follow this instruction may result in severe personal injury. See your Ford or Lincoln dealer.

⚠ **WARNING:**
Modifications to the front end of the vehicle, including frame, bumper, front end body structure, tow hooks and B-pillar surrounding parts may affect the performance of the airbag sensors, increasing the risk of injury. Do not modify the front end of the vehicle. Failure to follow these instructions may result in severe personal injury or death.

⚠ **WARNING:**
Do not place objects or mount equipment on or near the headliner at the siderail that may come into contact with a deploying safety canopy. Failure to follow this instruction may increase the risk of personal injury in the event of a collision.

⚠ **WARNING:**
Do not attempt to service, repair or modify the Safety Canopy® System, its fuses, the A, B, C, or D-pillar trim, or the headliner on a vehicle containing a Safety Canopy® System. See your Ford or Lincoln dealer. Failure to follow these instructions may result in personal injury.

NOTICE:
The side impact sensors are tuned to excite based on their mass (including wiring), as well as the host sheet metal. Any alteration to these components must be avoided. Additions, such as padding, wire connectors, retainers, tape or fasteners of any kind should not be used. All fasteners in this predominantly sheet metal environment should be made of steel or a non-conductive plastic to guarantee retention and longevity. If any part of a steel fastener is exposed to a wet area, it should be plated to resist corrosion.

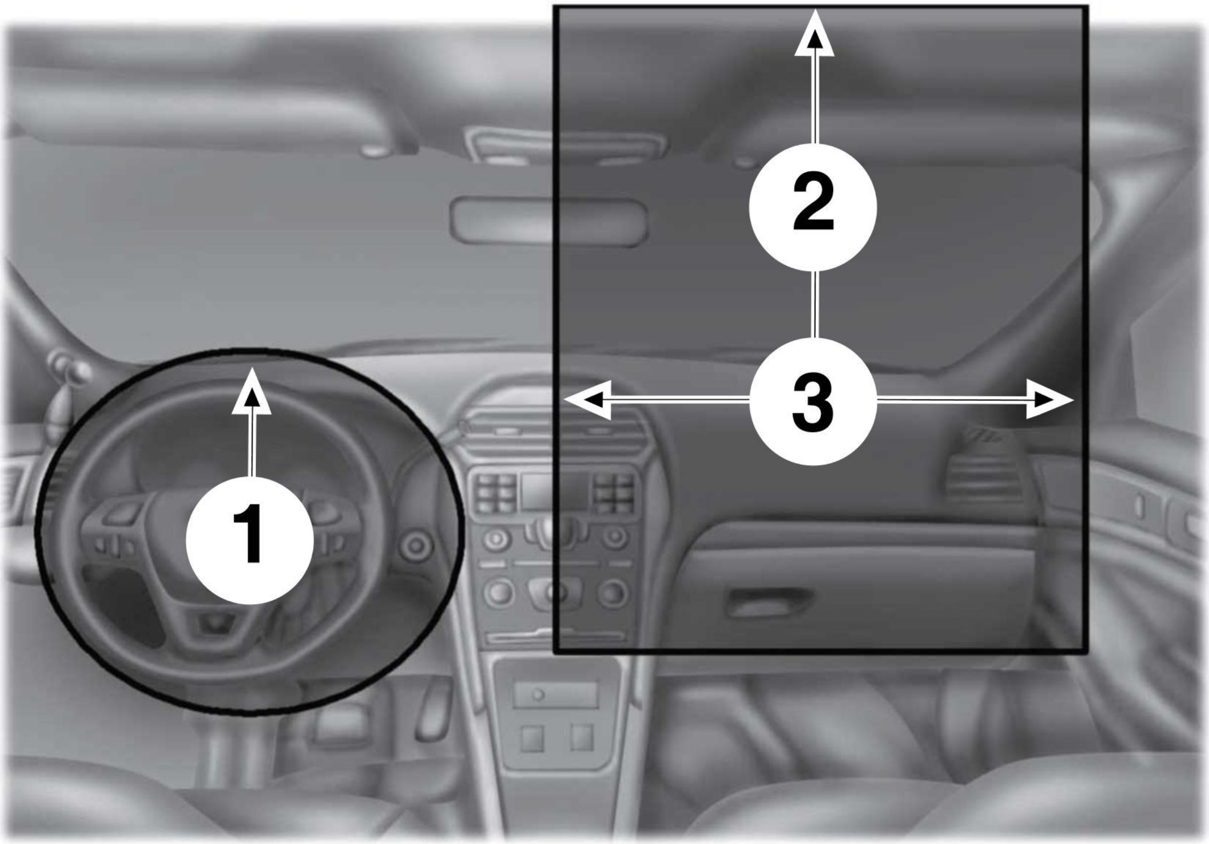
Driver/passenger airbags affect the way equipment can be mounted in vehicles. Any surface that could come into contact with an airbag during deployment must not damage the airbag or alter its deployment path. Sharp edges, corners or protrusions could damage the nylon airbag material and reduce the effectiveness of the airbag. Do not mount or place any objects in the deployment path of an airbag. Airbags must be allowed to fully deploy without restriction. The deployment of airbags is not compatible with any configuration of equipment mounting that places objects in the airbag deployment path. Equipment mounted or placed in the deployment area of an airbag will reduce the effectiveness of the airbag, damage the airbag and potentially damage or dislodge the equipment.

Some approximate dimensions for airbags, at full inflation, are provided. These dimensions are somewhat flexible and represent free-form deployments without the loading of occupants. The zone dimensions provided are approximate and will vary with the loading of occupants in the seats.

All airbag and equipment mounting zone dimensions are approximate due to different airbag deployment characteristics.

Do not mount equipment between the side of the front seat and the door trim that would block deployment of the side airbag.

Section 7: Airbag Deployment Interference Zones

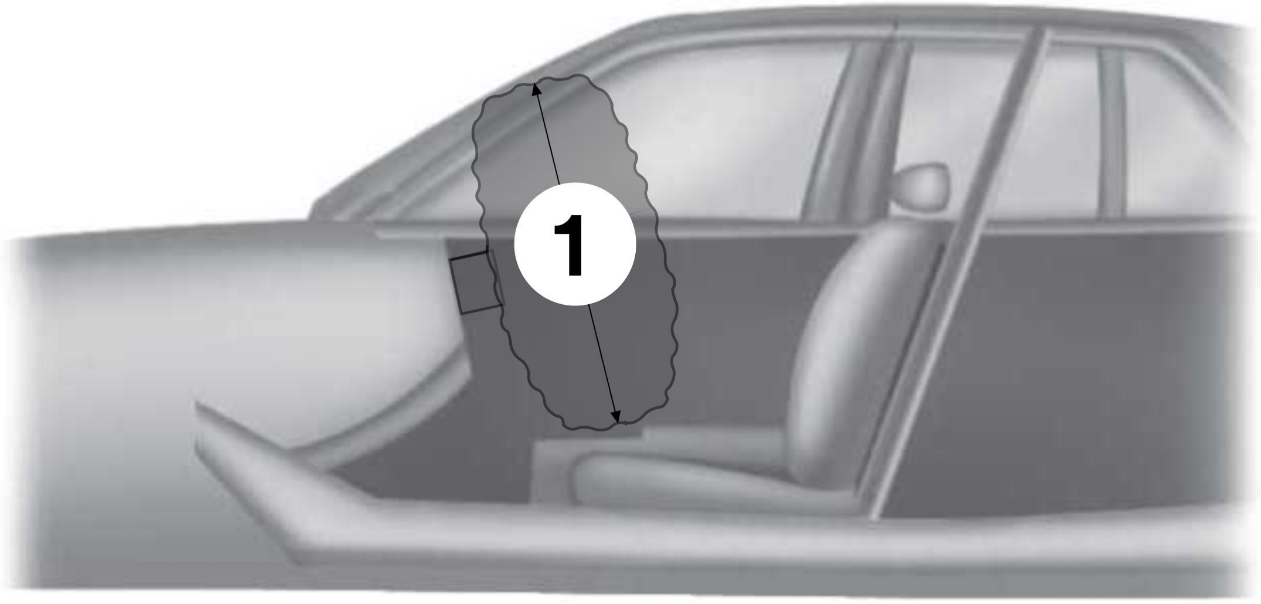


N0179716

NOTE:
Do not mount equipment on the instrument panel between the driver and passenger airbags due to deployment variability.

1. 240 mm (9.5 in) from center of emblem.
2.350 mm (13.8 in) from center of airbag door
3. 720 mm (28.3 in)

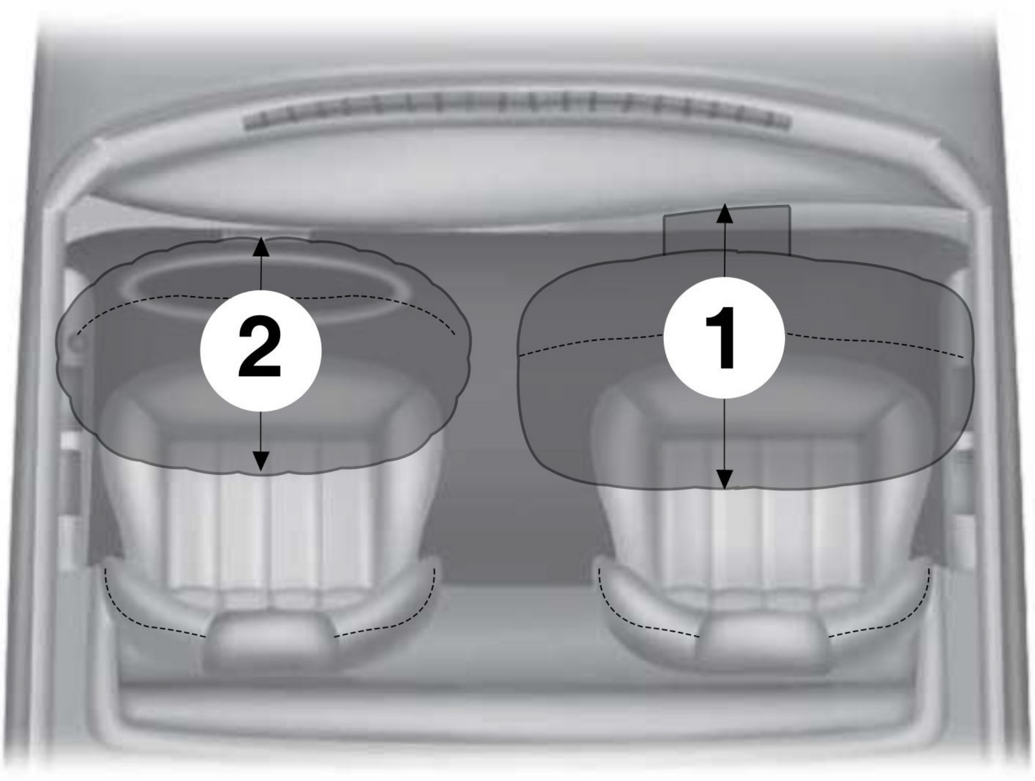
Section 7: Airbag Deployment Interference Zones



N0179718

1. 700 mm (27.5 in)

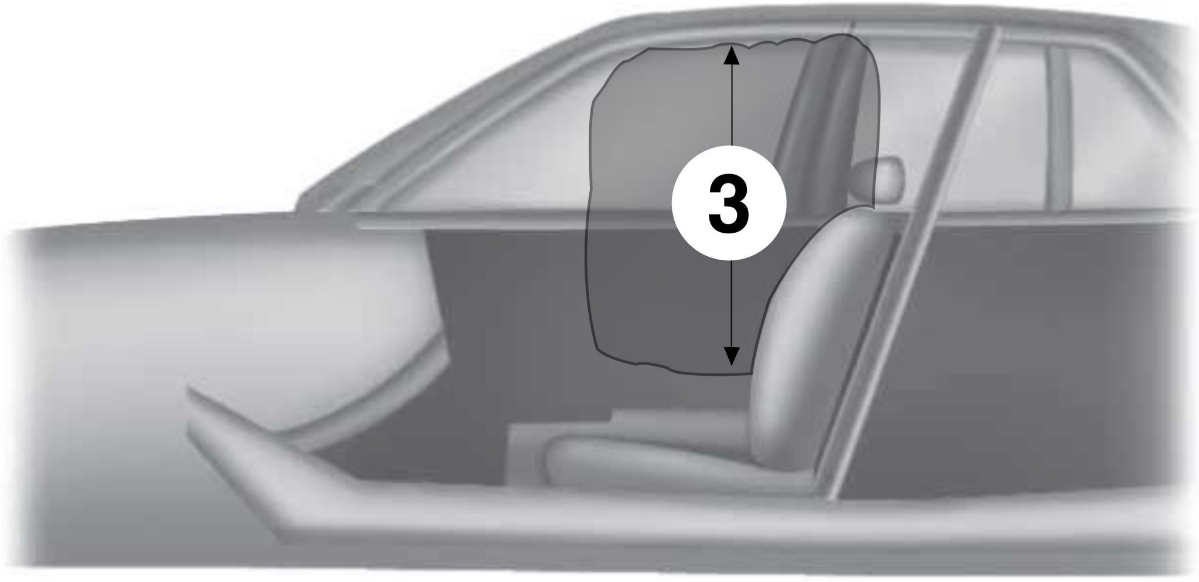
Section 7: Airbag Deployment Interference Zones



N0179719

1. 580 mm (22.8 in) Front passenger airbag.
2. 430 mm (17 in) Front driver airbag.

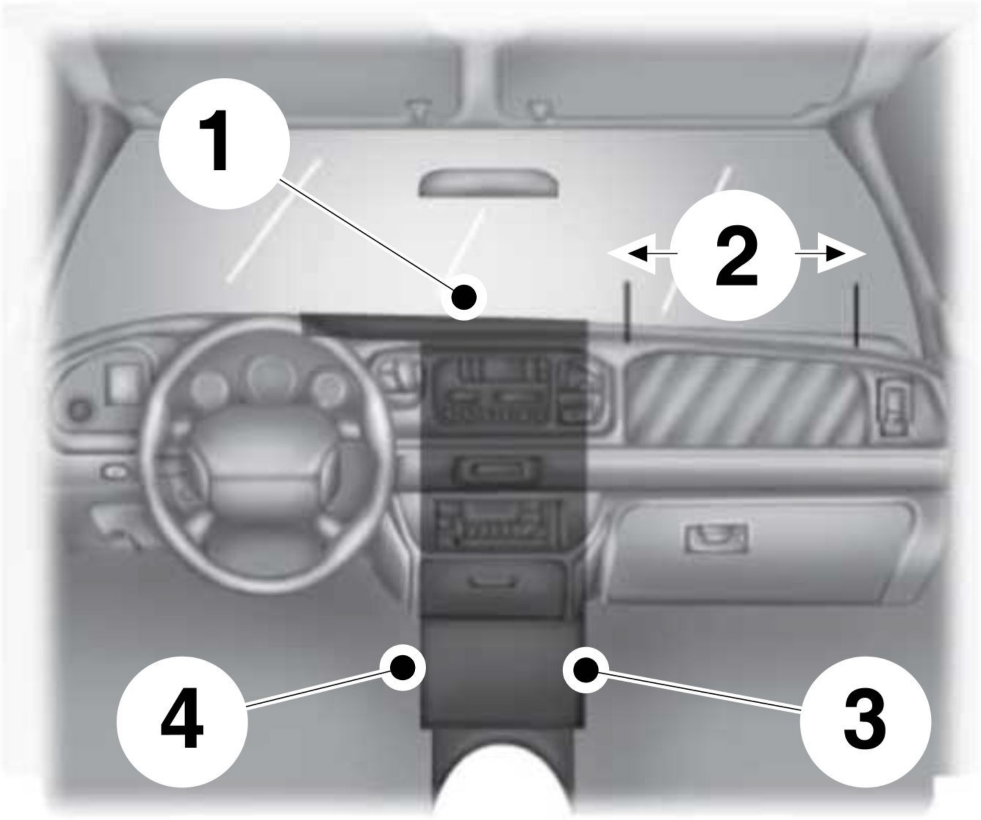
Section 7: Airbag Deployment Interference Zones



N0179721

3. 700 mm (27.5 in) Up from side airbag module

Section 7: Airbag Deployment Interference Zones



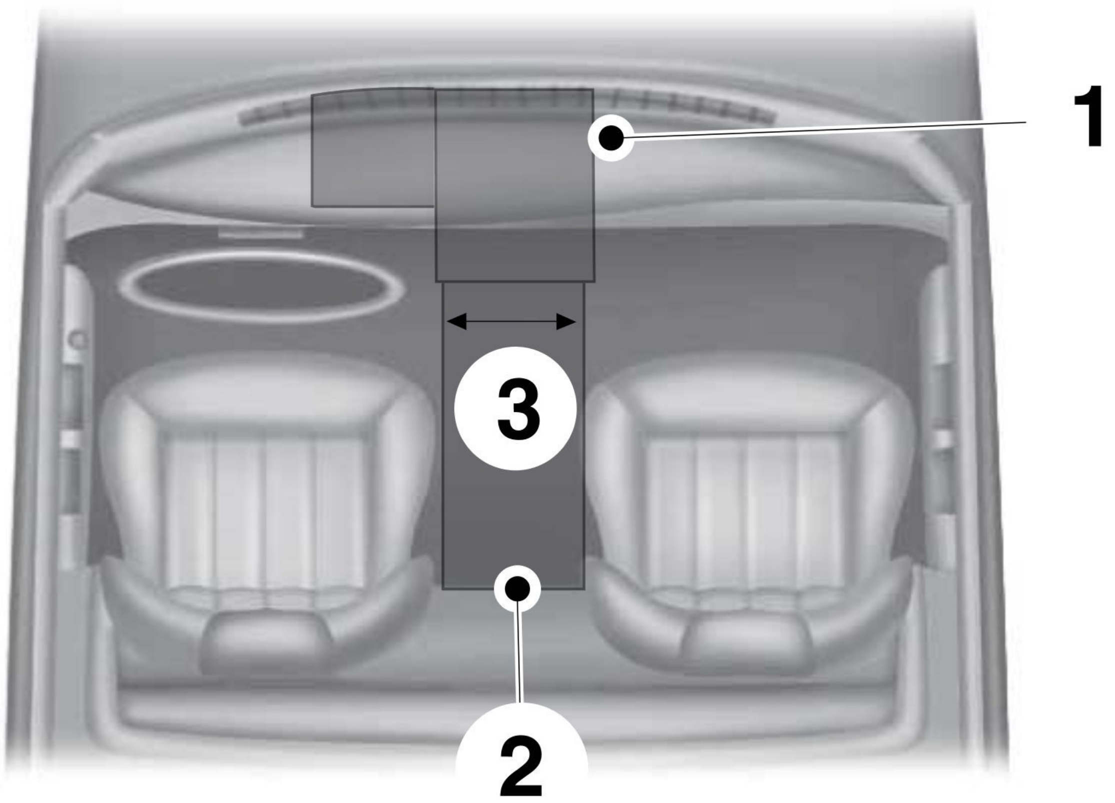
N0179722

1. Area on top of the instrument panel.

NOTE:
Equipment must not interfere with driver visibility.

2. Airbag door must be kept clear for deployment of the airbag.
3. Area in front of the center console from the bottom to the top of the instrument panel.
4. Area in front of electronic finish panel from the bottom to the top of the instrument panel.

Section 7: Airbag Deployment Interference Zones



N0179723

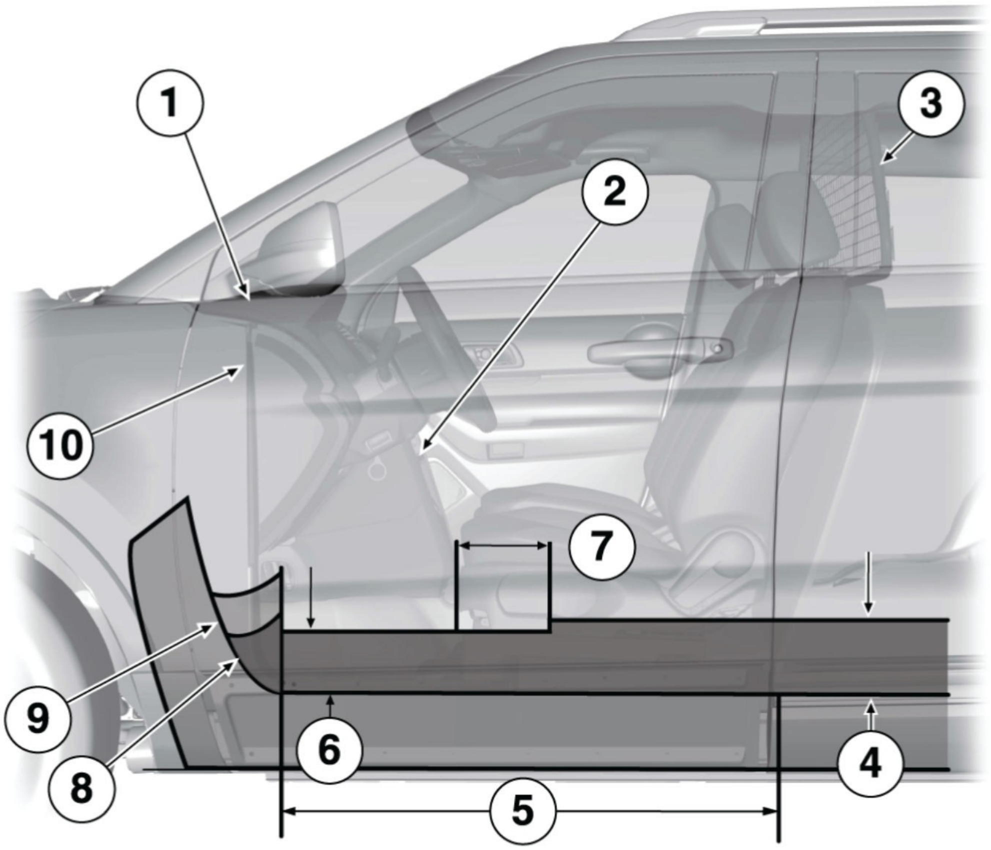
1. Area on top of the instrument panel.

NOTE:
Equipment must not interfere with driver visibility.

2.Area on tunnel between seats.

3. 229 mm (9 in)

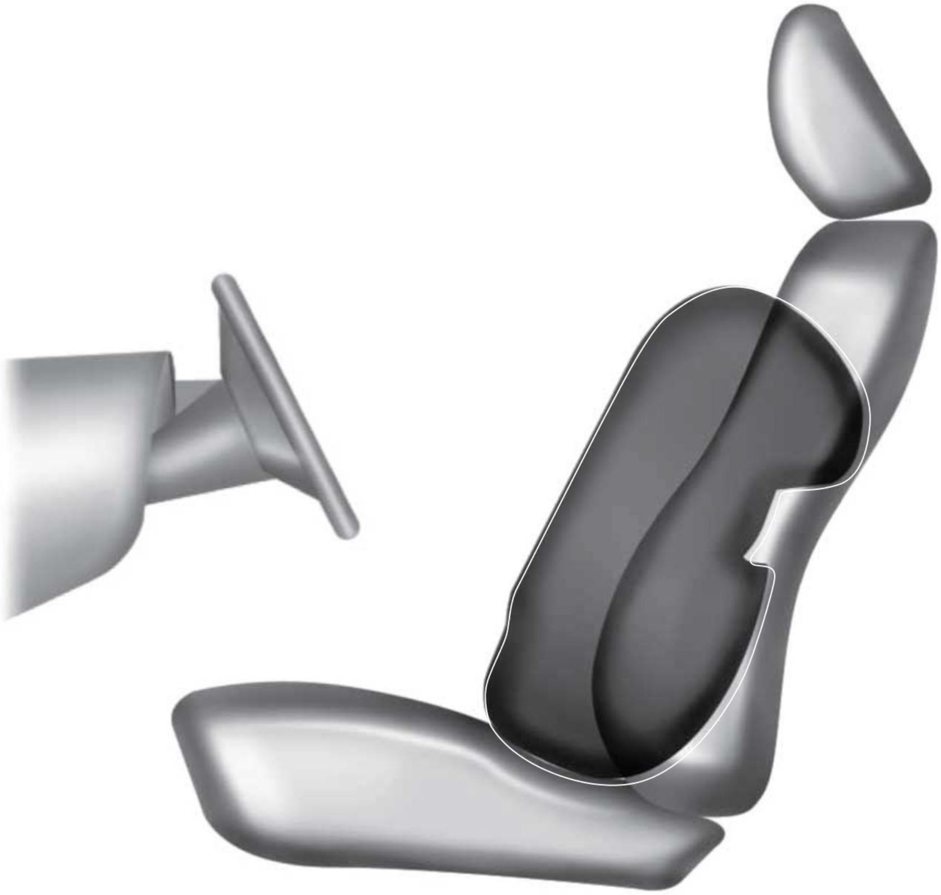
Section 7: Airbag Deployment Interference Zones



N0179724

1. Area on top of instrument panel.
2. Area in front of center console from tunnel up to instrument panel.
3.Prisoner screen (reference only).
4. 254 mm (10 in)
5. Area on tunnel between seats.
6.Height: 216 mm (8.5 in)
7. 305 mm (12 in).
8. Area on tunnel beneath center console.
9. Tunnel.
10. 38 mm (1.5 in).

Section 7: Airbag Deployment Interference Zones

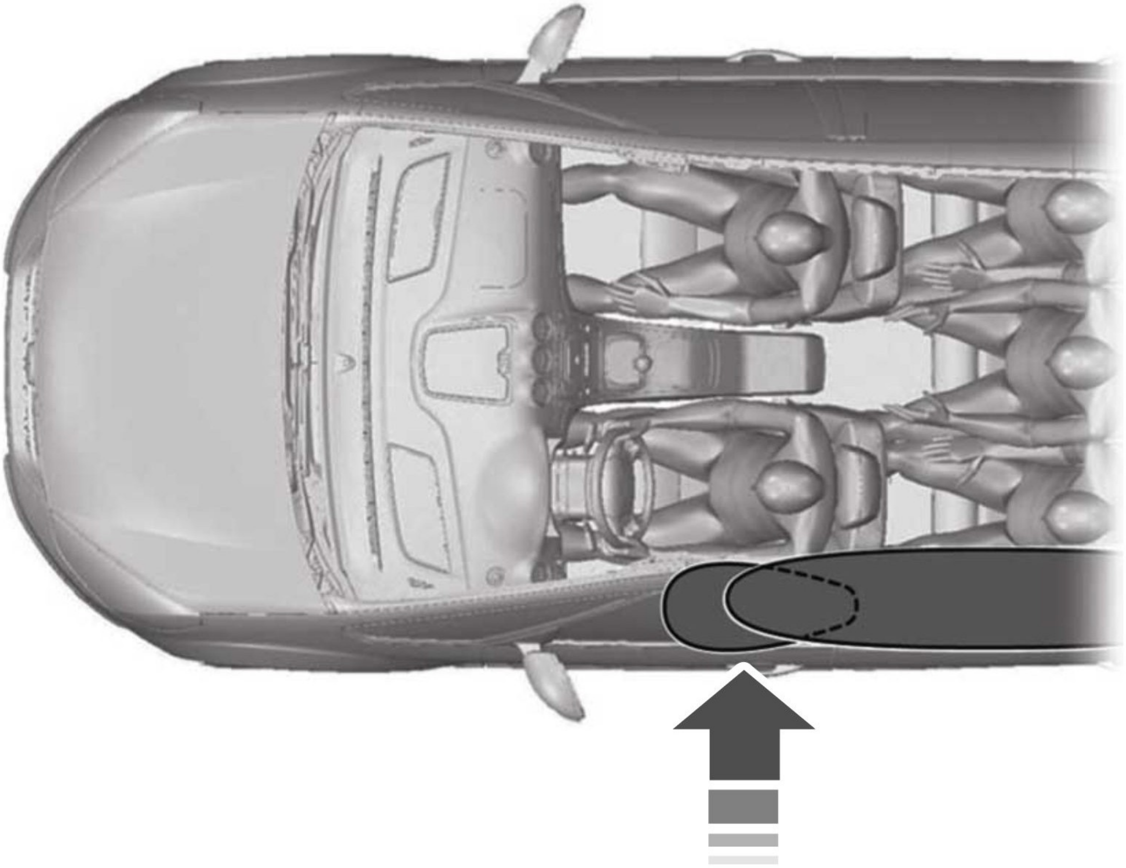


N0179736

The side airbags are located on the outboard side of the seatbacks of the front seats. In certain sideways crashes, the airbag on the side affected by the crash will be inflated. The airbag was designed to inflate between the door panel and occupant to further enhance the protection provided occupants in side impact crashes.

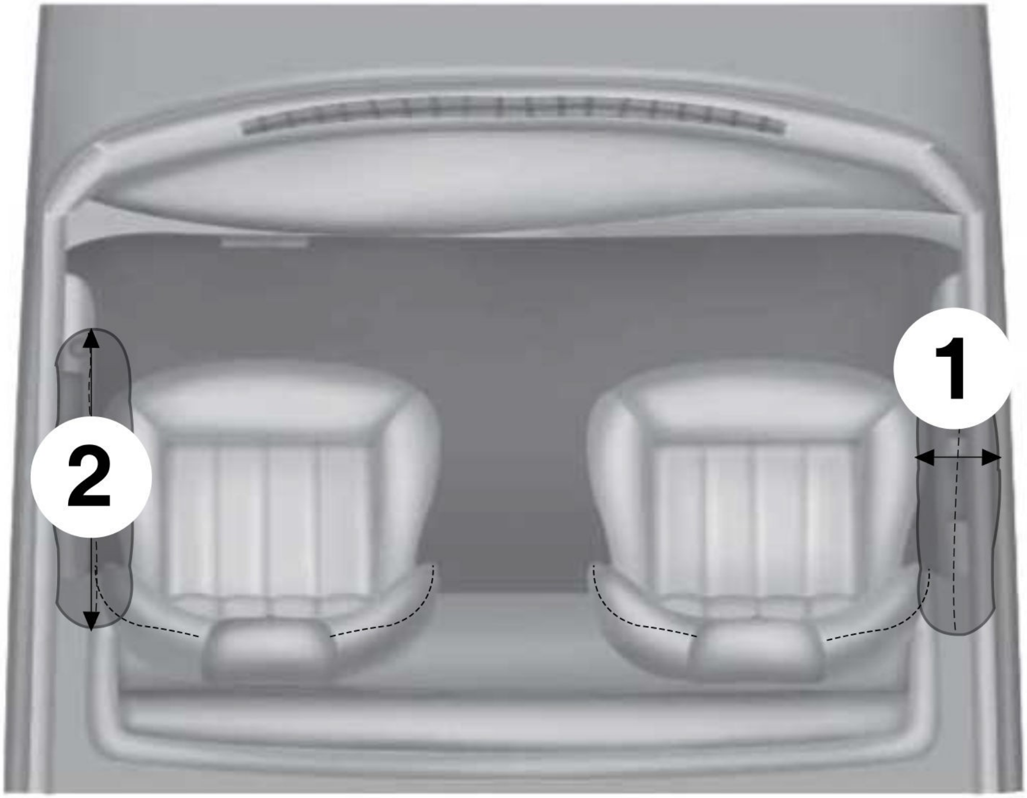
The Safety Canopy will deploy during significant side crashes or when a certain likelihood of a rollover event is detected by the rollover sensor. The Safety Canopy is mounted to the roof side-rail sheet metal, behind the headliner, above each row of seats. The Safety Canopy curtain airbags above the trim panels over the front and rear side windows identified by a label or wording on the headliner or roof pillar trim. In certain sideways crashes or rollover events, the Safety Canopy will be activated, regardless of which seats are occupied. The Safety Canopy is designed to inflate between the side window area and occupants to further enhance protection provided in side impact crashes and rollover events.

Section 7: Airbag Deployment Interference Zones



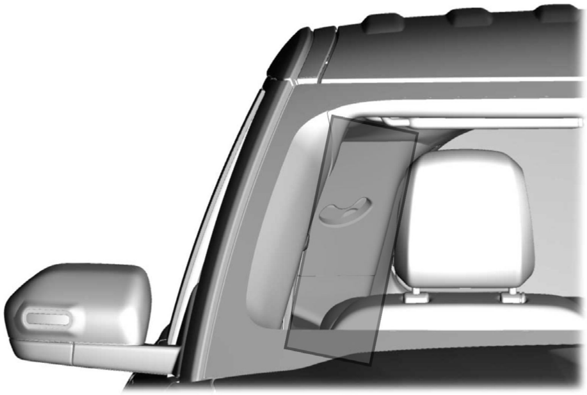
N0179717

Section 7: Airbag Deployment Interference Zones



N0179720

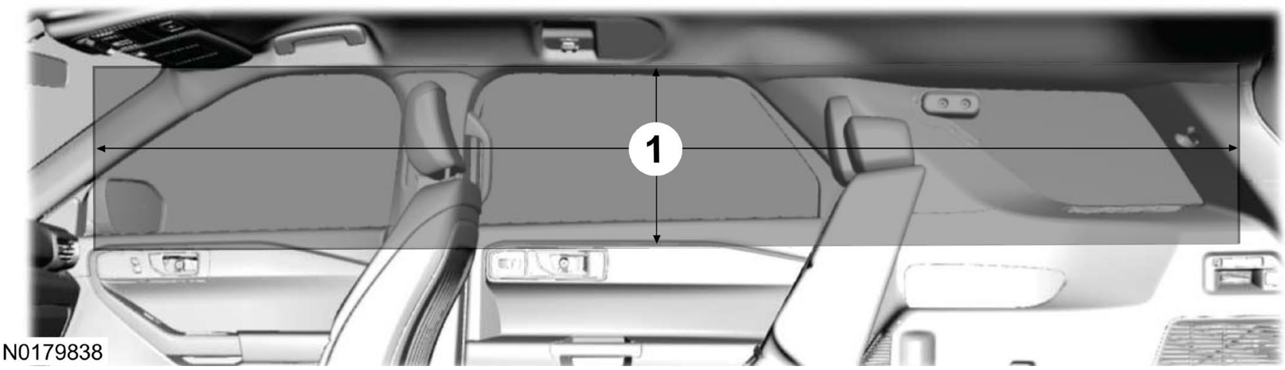
1. 200 mm (8 in) From outboard side of seat.
2. 380 mm (15 in) Forward of seatback.



N0179839

1. 75mm (6 in) from pillar trim (A through D)

Section 7: Airbag Deployment Interference Zones



1. Roof rail to 25mm (1 in) below window sill.

NOTICE:

Any surfaces that could come into contact with side air curtain (Safety Canopy® System) during deployment must not damage the curtain. Sharp edges, corners or protrusions could damage the curtain and reduce the overall effectiveness of the side air curtain.

NOTICE:

The side impact sensors are tuned to excite based on their mass (including wiring), as well as the host sheet metal. Any alteration to these components must be avoided. Additions, such as padding, wire connectors, retainers, tape or fasteners of any kind should not be used. All fasteners in this predominantly sheet metal environment should be made of steel or a non-conductive plastic to guarantee retention and longevity. If any part of a steel fastener is exposed to a wet area, it should be plated to resist corrosion.

- Do not mount equipment to the A, B, C and D-pillars.
- Do not mount equipment on the headliner within 200 mm (8 in) of the side edges.
- Do not mount equipment above the beltline within 200 mm (8 in) of the side glass from the A-pillar leading edge to the rear edge of the D-pillar.
- Do not mount equipment on the headliner along the siderails.